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# **COMPUTER POWER USER**



**HOW MUCH GPU DO I NEED? GRAPHICS CARD BUYING GUIDE** 



CLUNK

MAD MAX-INSPIRED MOD IS THE DUCK'S GUTS

# DECEMBER 2014 | VOL 14 ISSUE 12





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News, product release information, and stats from the tech industry.

## **HEAVY GEAR — P. 10**

The latest PC hardware is here: reviews, product profiles, and category roundups.

#### HARD HAT AREA — P. 29

CPU's Mad Reader Mod winner, LAN party coverage, and in-depth looks at the latest and greatest hardware and technology.

# **HOLIDAY GIFT GUIDE — P. 58**

Whether you need a last-minute gift for the PC fanatic in your life or you *are* the fanatic and you're looking for stuff to put on your list, we've got you covered.

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#### BACK DOOR — P. 86

Monthly last-page interview with people who help to shape the PC industry.

# DID YOU FIND THE HIDDEN CPU LOGO ON OUR COVER?





Gotcha. Here it is.

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# The Guardian Hardware Monitor



- Data storage health monitoring
- 9 LED channels
- 6-channel fan controller
- 5" full color TFT LCD touch display

Guardian Hardware Monitor and Spectrum fans integrate cooling control, hardware monitoring and LED lighting to deliver an unparalleled dynamic full color lighting experience to custom PC builds.

Donate to the Kickstarter campaign: http://kck.st/1A8SMgJ Guardian Hardware Monitor for gamers and custom desktop PCs

# **Spectrum Fans**



- O 24 RGB LEDs
- 12 LEDs addressable
- Strobe effects
- Endless variety of custom effects
- Cue effects and color changes on CPU/GPU temp and load, HDD access, receipt of email, instant messages and in-game health status and weapon fire.\*











# Thermaltake's Core V41 LCS Is A Spacious Mid-tower Built For Cooling

Enthusiasts like to fill their systems with the latest, greatest hardware, which means powerful air and/or liquid-cooling will be needed to keep down the temps. Fitting everything you want into a big tower may not be a problem, but some mid-towers just don't have the room. That's not a problem with Thermaltake's new Core V41. This spacious black mid-tower is ready for air- or liquidcooling, and can handle radiators up to 360mm at the top or front. The case has six 3.5-inch internal and two 5.25-inch external toolfree drive bays that can quickly be moved or removed as needed, and can handle ATX or smaller motherboards and graphics cards up to 16.1 inches long (10.8 inches with HDD cages installed). It also can fit CPU coolers up to 6.7 inches high. The Core V41 measures 10.7 x 9.1 x 19.3 inches (HxWxD) and comes with two 120mm fans (front and rear). The case retails for around \$90.

# Fractal Design Expands Power Supply Line With Edison M Series

Case and component manufacturer Fractal Design recently expanded its PSU offerings with the 80PLUS Gold-certified Edison M Series. Available in 450W, 550W, 650W, and 750W models, Edison M power supplies generate less heat and according to the company also run quieter because they are so efficient. The units come with a 120mm temperaturecontrolled fan with fluid dynamic bearings for quiet operation. All models come with a complete suite of built-in tools to protect your computer including Over/Under Voltage Protection, Short Circuit Protection, Over Current Protection, and Over Temperature Protection. Edison M PSUs are semi-modular and come with all black, flat cables including an extra long 12-volt connector cable for when you want to mount your supply at the bottom of a large case. Prices range from \$85 to \$120.



## **WATCHING THE CHIPS FALL**

Hara ia tha priaine	CPU	Released	Original Price	Last Month's Price	Online Retail Price*
Here is the pricing information for various AMD and Intel CPUs.	AMD FX-9590 Eight-Core	6/11/2013	N/A	\$259.99	\$244.99
	AMD FX-9370 Eight-Core	6/11/2013	\$375	\$219.99	\$219.99
	AMD FX-8350 Eight-Core	10/23/2012	\$195	\$179.99	\$159.99
	AMD FX-8320 Eight-Core	10/23/2012	\$169	\$149.99	\$149.99
	AMD FX-6350 Six-Core	4/30/2013	\$132	\$129.99	\$124.99
	AMD A10-7850K Quad-Core	1/14/2014	\$173	\$159.99	\$149.99
	AMD A10-7700K Quad-Core	1/14/2014	\$152	\$139.99	\$129.99
	AMD A10-6800K Quad-Core	6/4/2013	\$142**	\$139.99	\$129.99
	AMD A10-6790K Quad-Core	10/28/2013	\$130	\$129.99	\$129.99
	AMD A10-6700 Quad-Core	6/4/2013	\$142**	\$140.99	\$129.99
* As of November 2014 ** Manufacturer's estimated price per 1,000	Intel Core i7- 5960X Eight-Core	8/29/2014	\$999**	\$1,049.99	\$1,049.99
	Intel Core i7- 4960X Six-Core	9/3/2013	\$990**	\$1,027.99	\$1,027.99
	Intel Core i7- 5930K Six-Core	8/29/2014	\$583**	\$589.99	\$579.99
	Intel Core i7- 4930K Six-Core	9/3/2013	\$583**	\$579.99	\$577.99
	Intel Core i7- 5820K Six-Core	8/29/2014	\$389**	\$389.99	\$389.99
	Intel Core i7-4790K Quad-Core	6/25/2014	\$339**	\$339.99	\$329.99
	Intel Core i7-4770K Quad-Core	6/2/2013	\$339**	\$334.99	\$334.99
	Intel Core i7-4820K Quad-Core	9/3/2013	\$323**	\$324.99	\$322.99
	Intel Core i7-4790 Quad-Core	5/11/2014	\$303**	\$309.99	\$304.99
	Intel Core i5-4690K Quad-Core	6/3/2014	\$242**	\$239.99	\$239.99



# Want To Play Like A Pro? Get The Plextor M6e Black Edition SSD

Plextor's M6e solid-state drives are some of the fastest on the market, and now the company has announced it is coming out with a Black Edition aimed squarely at professional gamers. Built with the best Toshiba synchronous Toggle Mode NAND memory and the latest-generation dual-core Marvell 88SS9183 controller, the M6e Black Edition SSD boasts sequential read/write speeds up to 770/625MBps and random read/write speeds that top 105K/100K IOPS. The drives are not only built with top notch hardware, they also feature newly developed PlexTurbo 2.0 intelligent caching technology that accelerates drive performance. The Plextor M6e Black Edition SSDs will be available in January 2015 in 128GB, 256GB, and 512GB capacities. Pricing on these speedy drives was not yet available as we went to press.

# be quiet! Releases Entry-Level Cooler For Builders On Budgets

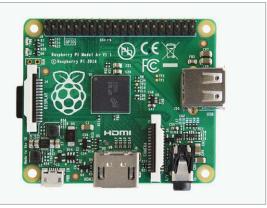
Component manufacturer be quiet! is known for building beautiful, high-end CPU coolers, fans, and other computer parts. Now the German company is introducing its first line of entry-level CPU coolers that incorporate many of the same features as its high-end models, but at prices that will appeal to first-time builders and others on a budget. The Pure Rock cooling line features four 6mm heatpipes that be quiet! says will draw up to 130 watts of heat away from your CPU. The coolers have a 120mm Pure Wings fan with a rated lifetime of 80,000 hours and a maximum speed of 1,500rpm. Even at top speed, the fan operates at under 26.8 decibels. Thanks to its compact design (6.1 x 4.76 x 3.44 inches), the Pure Rock CPU cooler should easily fit into most cases, and be quiet! says it works with all current Intel and AMD sockets. MSRP is 32.9 Euros (around \$41).





# HP Combines Scanner, Projector, Camera & CPU In Sprout Computer

HP went back to the drawing board in re-imagining how computers will be used in the dawning age of 3D printing. The company has taken a high-res camera, scanner, depth sensor, and projector, and combined those elements with a highpowered touch-screen computer in a new type of computing configuration that it calls Sprout. A capacitive touch mat at the base of the system also acts as a second screen; the user can scan 3d objects with the system and project them on the mat, where they can be manipulated. HP says the system is the first to attempt to bridge the gap between the physical and digital worlds, allowing people to work with digital creations in 3D. Sprout doesn't skimp on power, either: the computer includes an Intel i7 processor and 1TB of storage. HP also has launched the Sprout Marketplace where users can find applications geared toward the immersive platform. Sprout retails for about \$1,900.



# Smaller Slices Of Raspberry Pi Now Available Thanks To New Model A+

The folks at the Raspberry Pi foundation have come out with a reconfigured version of the orginal Raspberry Pi Model A system board. The Model A+ version sports the same BCM2835 processor and 256MB of RAM as the original board, but it uses less power, includes better audio, and now has an enhanced microSD socket. The A+ is also guite a bit smaller in size than the original Model A, with a length of only 2.56 inches as compared to 3.38 inches on the first slice of Pi. GNU/Linux users, small-system tinkerers, budding programmers, and others who just like to experiment with different computing form factors should check out the Model A+ version of Raspberry Pi. The new version of Pi has a nice new price, too: the credit-card-sized board is currently available for only \$20 from www.raspberrypi.org.

#### **HARDWARE MOLE**



# **Corsair Gaming Division Intros New Gaming Sabre RGB Mice**

Corsair Gaming has announced the Ultralight Corsair Gaming Sabre RGM mouse, available in two versions, optical or laser, depending on your sensor preference. The optical Sabre RGB has a 6,200dpi sensor, while the sensor on the laser Sabre RGB offers even more precise tracking up to 8,200dpi. Both mice have a body that weighs less than 100 grams and four customizable color zones so you can adjust the look of the mouse to match your PC. With its light weight and ergonomic design, the Sabre RGB is a highly responsive gaming mouse. Eight progammable buttons and Corsair's CUE software ensure you can customize the Sabre RGB to fit your gaming style. MSRP for the optical version is \$59.99; you'll pay \$10 more for the laser one.

# MAINGEAR Offers microATX Fans Attractive Options With X-Cube

Small form factor systems are enjoying a surge of popularity thanks to new mainboards that pack a lot of power in tiny packages. Users looking at microATX options for their next system should consider the X-Cube from MAINGEAR. The 16.3 x 13.1 x 18 inch X-Cube includes three 140mm fans (2 front, 1 rear) and can handle up to five more (or six 120mm fans). The case has room for two graphics cards and can be cusomized with MAINGEAR's EPIC 120 or 240 Radiators for liquid-cooling. A full range of component options is available. Go to www.maingear.com/custom/sff/xcube to see system configurations that start at \$799.





# Rice University Researchers Want To Make Programming Easier

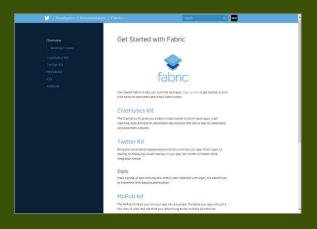
Imagine a sort of universal programming aid that could take an outline for a new program in any language and autocomplete it—and even autocorrect any coding problems. That's the ambitious goal for a new research project now underway at Rice University. Called "Pliny" after the Roman naturalist who compiled the first encyclopedia, the four-year, \$11 million project is being funded by DARPA. Researchers believe they can create something that will significantly change the way software is created and debugged in the future. In a release sent out by the university, Swarat Chaudhuri, assistant professor of computer science at Rice, said the Pliny team envisions "a system where the programmer writes a few of lines of code, hits a button and the rest of the code appears." For more on Pliny, go to bit.ly/1zm0aS8.

# Nest Notifies Thermostat Users They're Getting A Software Update

Nest, the thermostat and connected home people, let users know their units would be getting an automatic update to version 4.3 soon. The new software is supposed to help the auto scheduling feature in Nest Thermostats learn user habits even sooner, which the company says can lead to savings of up to 6% on home energy bills. A Quick View feature will let users check the current temperature and humidity . . . outdoors. Quick View also will make it easier for users to find out information pertinent to their system usage, such as how much energy they used yesterday. Other improvements include a new System Test feature that will walk users through operation spot checks so they can tell if their heating and cooling systems are working properly, and that also will offer some basic troubleshooting advice.



#### **SOFTWARE SHORTS**



# Twitter Releases "Fabric" Platform For Mobile App Developers

The folks at Twitter recently decided to give mobile app developers a boost by releasing several kits they say form the basis of a "modular mobile platform" called Fabric. The kits include Crashlytics, a way to identify what is causing an app to crash and how many users are affected; MoPub, a kit that is an advertsing platform that will help developers drive revenue with their apps by integrating ads; and Twitter Kit, a set of tools to help apps make use of the information contained in the more than 500 million Tweets Twitter users send out each day. For more information on what is contained in each of the three kits that make up Fabric, and to download the entire platform, go to dev.twitter.com/fabric.



# Mozilla Creates Virtual Reality Site To Help Developers Figure Out VR

For all the buzz in recent months about virtual reality, there's still not a lot of content out there that makes use of the technology. News stories occasionally tell about some new application under development or tech breakthrough on the horizon, but overall progress in the field is still painfully slow, especially for those who anticipate VR will play a major role in many areas in the future. The folks at Mozilla decided the best way to help keep things in the field moving was to create a site where VR developers could experiment and share what they have learned. So they recently launched MozVR.com, a site that says it's "a VR website about VR websites," where developers can share their experiences to "help foster the emerging virtual reality web." There already are VR demos on the site (a documentary on the Polar Sea, a fly-by of the British Columbia coast, and so on). See the site's home page for required system specs and then enjoy the show.

# Elon Musk Decides The Rest Of The World Needs Internet Access

So what do you do after founding an electric car company, a solar power company, a private space exploration technologies company, and a few other commercial concerns, all before you turn 43? Look for new worlds to conquer, of course! Tesla/SpaceX CEO and Solar City Chairman Elon Musk recently tweeted that SpaceX was developing a fleet of "advanced micro satellites" and that an announcement on the project would be coming in the next few months. The enigmatic tweet followed stories in the media that SpaceX was working on using small satellites to make Internet access possible in the farthest reaches of the globe. Exactly what SpaceX (and Musk) have planned at this point is unknown, but making it possible to go online and connect with the rest of the world no matter where you are on the planet sounds like a worthwhile project to us.



# **SITE SEEING** where to watch The movies and TV shows you love. Simple search. Easy access MOVIES

# Where To Watch Lets Users Know Where They Can Legally Get Content

Feel like downloading a recent movie, but don't want to break the law doing it? Skip the pirate sites and go to WhereToWatch .com instead. Six studios, all members of the MPAA (Motion Picture Association Of America), have pooled resources to create a site where users can find legal places to download movies and TV shows. You can search content by type (movie? television?), by genre (comedy? drama?) and even by names of actors or directors. The search isn't exhaustive, but when it does find what you're looking for, you'll see options listed across the bottom of the screen for streaming or for purchasing DVD & Blu-ray copies. And then you won't have to worry about someone knocking on your door someday saying "we represent so-and-so, and you're being served."



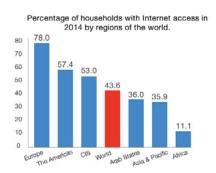
# Job Of The Month

The company that made it possible for even the smallest of businesses to accept credit card payments is growing, and it's looking for people with technical expertise to help take it to the next level. Square has a number of programming and engineering positions available, including one for a Data Warehouse Developer in its San Francisco offices. The DW Developer will get to know the ins/outs of data flows at Square and will work on "data modeling, ETLs, and BI tool integration." You'll keep the infrastructure humming and stay on top of emerging technologies that may affect the business. Candidates must have a BS/BA in CompSci, EE, or math (can sub in 5 years' experience if they have a degree in some non-STEM field), and have expertise in data modeling, data warehousing, SQL databases, scripting languages (Ruby, anyone?) and UNIX. If you'd like to help Square transform data into useful business tools and opportunities, check out the careers link at <a href="https://www.squareup.com">www.squareup.com</a>.

Source: www.squareup.com

# This Old Internet House

The ITU (International Telecommunications Union), the United Nations agency in charge of information technologies, has released its sixth annual report on how countries and regions of the world compare when it comes to adopting and using information and communication tech. This year's report says 3 billion people—a little over 40% of the world's population—are now using the Internet. But the percentage of people who have Internet access varies widely by location. For example, the chart at right shows how households in different regions of the world compare when it



Note: CIS = Commonwealth of Independent States; these countries were formerly republics in the Soviet Union.

comes to Internet access. While nearly eight out of 10 European households have Internet access as of 2014, worldwide only 43.6% can go online. Far behind other areas of the world are households in Africa, where just over one in 10 has Internet access.

Source: www.itu.int

# Tell Me . . . Is It Safe?

Digital technology and the Internet may have sparked a revolution in communications, but when it comes to security, a lot of people feel using an old-fashioned landline is best. As part of an ongoing study of how people perceive security and privacy following the revelation of extensive government surveillance programs by Edward Snowden, Pew Research asked people how secure they felt when using different communication tools. The results showed that most people no longer consider any means of communication very secure, least of all the interactions taking place via social media.



	Very Secure	Somewhat Secure	Not Very Secure	Not At All Secure
Using A Landline	16	51	19	12
Calling On Cell Phone	9	43	29	17
Sending Text Messages	7	32	37	22
Sending Email	5	35	36	21
Using Chat Or IM	4	25	36	32
Using Social Media	2	14	28	53

Source: Pew Research

# Manhers:

# 50

Approximate number of processes going on in the human brain at a given time. Neuroscientist Harris Georgiou used volunteer test subjects and MRI imaging to determine the equivalent of about 50 CPU cores were at work processing information in a subject's brain while the person performed simple tasks.

www.io9.com

# 75%

The percentage of people surveyed across 10 countries by Honeywell Process Services who fear their country's economy could be damaged by cyber attacks.

www.honeywellprocess.com

# 104

Number of minutes it takes for the accumulated energy of the sunlight reaching earth to equal the amount of energy humans use on the entire planet in one year.

www.motherjones.com

# 255

Number of terabits that researchers at Eindhoven University of Technology were able to send over a 1 kilometer fiber optic cable in one second by employing various multiplexing techniques. This is roughly equivalent to sending 6,375 HD movies (at 5GB each).

www.nature.com

# \$9.3 billion

Amount that shoppers spent online at Alibaba on November 11 this year. The day is a national shopping holiday in China known as the Shopping Festival or "Double 11."

www.alizila.com

# ASUS RAMPAGE V EXTREME

If there was a Mount Rushmore of elite motherboard lineups, the ASUS RAMPAGE EXTREME would certainly be there. The RAMPAGE EXTREME family consists of ASUS' flagship motherboards for Intel Extreme Edition processors, and the boards have routinely been among the top choices for enthusiasts since ASUS introduced the X48-based RAMPAGE EXTREME. The RAMPAGE V EXTREME is ready to wrangle Intel's Haswell-E CPUs, and it comes loaded with overclocking goodies. Get your bibs ready, because the RAMPAGE V EXTREME has plenty to

The RAMPAGE V EXTEME caters to overclockers of every skill level, as there are tools for both LN2 and traditional overclocking. For example, overclockers using LN2 should like that ASUS includes its X-Socket II bracket to allow for the use of existing LGA1366 LN2 or dry-ice evaporator pots. The RAMPAGE V EXTREME also features ASUS' OC Socket, which provides you with more pins than the reference LGA2011-v3 socket. The extra pins give you access to settings you couldn't otherwise adjust with the reference socket, such as the cache bus voltage. Tremendous overclocking potential isn't limited to the CPU, either, as the ASUS RAMPAGE V EXTREME supports DDR4 frequencies up to 3,300MHz.

ASUS also incorporates several features that streamline the overclocking process. At the top of the list is a ReTry button, which does away with hard resets or AC power cycles during processor hard locks. There's also a Safe Boot button to power up the system using safe parameters without resorting to the clear CMOS button. This way, you can return to your previous settings and tweak them for stability. LN2 Mode and Slow Mode switches help the RAMPAGE V EXTEME better deal with overclocking margins and adjust temperatures when using sub-zero



cooling. Other highlights include ProbeIt voltage read points, PCI-E x16 lane switches to disable GPUs, and a MemOK! button to load failsafe memory settings.

The RAMPAGE V EXTREME also makes it easy to perform real-time system monitoring and tuning. ASUS includes its OC Panel, which is an overclocking command center that can be installed into a 5.25-inch drive bay (Normal Mode) or outside the case (Extreme Mode). When installed into a 5.25-inch drive bay, you can view CPU temps, base clocks, and fan speeds. The LCD screen also features a CPU Level Up button to engage preset speed boosts. In Extreme Mode, you can manage even more settings. For example, there are Subzero Sense and

VGA Hotwire inputs for fast, accurate temperature readings and easy GPU overvolting, respectively.

Thus far, we've focused solely on the RAMPAGE V EXTREME's overclocking capabilities, but ASUS has also complemented the X99 chipset with other enhancements. PCI-E based storage is available via two SATA Express ports that support 10Gbps data transfers. There's also an M.2 port that uses the PCI-E 3.0 x4 standard, so it can support a theoretical maximum bandwidth of 32Gbps. (When in use, the M.2 port shares bandwidth with the motherboard's PCIeX8\_4 slot.) The SATA Express and M.2 ports set you up for future storage devices,



while the motherboard's eight 6Gbps SATA ports will cover your current storage needs.

Exceptional networking is standard, too. For wired connections, the RAMPAGE V EXTREME uses Intel's I218-V controller to maximize TCP and UDP throughput. To optimize your network connection, ASUS packs its GameFirst III utility, which lets you do things such as assign top priority to game packets and allocate more bandwidth. For wireless networking, ASUS installs an 802.11a/b/g/n/ac module that supports 1.3Gbps throughput. The module even comes with 3T3R dual-band antenna for a reliable, wide coverage range.

We've always been impressed with the onboard audio found on ASUS boards, and here, you'll find ASUS' SupremeFX 2014 hardware and software. The technology includes a stainless steel EMI protection cover on the audio chip, ELNA audio capacitors, ASUS Sonic SenseAmp (which automatically detects headphone impedance and adjusts the built-in amp

accordingly), and ASUS Sonic SoundStage (lets you quickly apply ideal sound settings for a game genre). It's a combination that rivals dedicated sound cards.

In our benchmark tests, the RAMPAGE V EXTREME lived up to expectations. It tore up 3DMark Professional's Fire Strike Extreme test with a Score of 6444, highlighted by a Graphics Score of 6654. In Cinebench 15, we saw a mark of 1400, which was a good 30 to 70 points higher than other X99 motherboards we've tested. Memory performance was also impressive, with 49.68GBps and 51.16GBps in SiSoftware Sandra 2014 Lite's Memory Bandwidth test.

If you're a serious overclocker, the RAMPAGE V EXTREME should on your short list. Whether you're trying to break world records or just get the most out of a liquid-cooled rig, the RAMPAGE V EXTREME has the tools you'll need to get the job done. The bundled OC Panel is a great addition, too, since you can easily make real-time tweaks. The

Benchmark Results	ASUS RAMPAGE V EXTREME
3DMark Professional (Fire Strike Extreme)	6444
Graphics Score	6654
Physics Score	17053
PCMark 8	
Creative Score	5128
SiSoftware Sandra 2014 Lite SP3	
Dhrystone AVX2 (GIPS)	313.23
Whetstone AVX (GFLOPS)	189.4
Multi-Media Integer AVX2 x32 (Mpixels/s)	460
Multi-Media Long-int AVX2 x16 (Mpixels/s)	204
Multi-Media Quad ALU x1 (Mpixels/s)	3.53
Integer B/F AVX/128 (GBps, mem bandwidth)	49.68
Floating B/F AVX/128 (GBps, mem bandwidth)	51.16
POV-Ray 3.7 Beta*	2810.26
Cinebench 15**	1400
Games (2,560 x 1,600)	
Metro: Last Light (16XAF)	58.57
Aliens vs. Predator (4XAA, 16XAF)	62.5
* pixels per second	
** points	

RAMPAGE EXTREME family has an outstanding reputation, and this motherboard only adds to the dynasty.

BY NATHAN LAKE

Specs: Max Memory: 64GB DDR4 (DDR4-2133;DDR4-3300 max OC); Slots: 4 PCI-E 3.0 x16, 1 PCI-E 2.0 x16 (x4 mode), 1 PCI-E 2.0 x1; Storage: 2 SATA Express, 1 M.2 (type 2260/2280/22110), 8 6Gbps SATA; Rear I/O: 10 USB 3.0, 2 USB 2.0, 1 PS/2, 1 optical S/PDIF out, audio I/O, 1 Ethernet, 1 Clear CMOS button, 1 ROG Connect On/Off switch, 1 ASUS Wi-Fi GO! module, Form factor: E-ATX; Warranty: 3 years

Test system specs: Processor: Intel Core i7-5960X; GPU: ZOTAC GeForce GTX 980 AMP! Extreme Edition; Memory 16GB Crucial Ballistix Sport DDR4-2400; Storage: 240GB OCZ Vertex 3 MAX IOPS SSD; OS: Windows 8 Pro (64-bit)



# Tt eSPORTS Challenger Prime

The gaming keyboard market has exploded in recent years, with keyboards available at every price and with a dizzying array of features. You can spend close to \$200 on a keyboard these days, and it will do everything short of playing the games for you, but Thermaltake's Tt eSPORTS division knows that not everyone wants to drop that kind of cash on what essentially amounts to a game controller. Factor in the odds of flooding your keyboard with Blue Raspberry Icee or dropping it in the snow on your way to gear check-in at LANFest NETWAR (not that either of these things has ever happened to us, mind you), and it probably makes sense to find a keyboard that gives you the functionality and comfort you need without spending motherboard money on it.

That's where the Tt eSPORTS Challenger Prime comes in. With an MSRP that's a hair below 30 bucks, the Challenger Prime is practically an impulse purchase, but that doesn't mean that it won't deliver. The keyboard has up to 18 macro keys (six dedicated keys and three profiles), provides three-color backlighting (red, blue and purple), lets you adjust its polling rate (up to 1,000Hz), and even includes niceties like a 5-foot nylon-braided USB cable.

Of course, the most important thing about any keyboard is whether it performs capably and comfortably, and the Challenger Prime does. It has big keys and a familiar layout, the only thing out of the ordinary being the six macro keys that run in a vertical row along the left side of the keyboard and the full suite of media control and configuration keys running across the top above the Function keys. The big, round dial in the middle of the top row of keys lets you quickly and easily control the brightness of the Challenger Prime's backlighting.

Tt eSPORTS builds in six-toeight-key anti-ghosting (aka rollover), so your commands don't get lost in the heat of battle, and the membrane keyswitches are soft but responsive. The included software lets you re-map keys, set up macros and assign them to shortcut keys, adjust the keyboard's response time, load additional game profiles (the keyboard stores three at a time, but swapping in new ones is easy), and more. The Challenger Prime even has a clever antispill design, with drainage holes that run from beneath the keys through to the bottom of the keyboard, just in case you run into the (purely hypothetical) Icee scenario mentioned above.

We think you'll agree, that's quite a bit of functionality for 30 bones. And at that price, you'll be too busy playing the games you bought with all the money you saved to miss the gold-plated USB plug or the onboard fan.

BY CHRIS TRUMBLE

**Challenger Prime** \$29.99 Tt eSPORTS usa.ttesports.com

Specs: Interface: USB; Cable length: 5 feet; Switch type: Membrane; 6-8 key anti-ghosting; Macro support: 6 macro keys, 3 profiles; 3-color backlight; 2-year warranty

# NEW HOSTING

**POPULAR APPS - NOW EVEN BETTER!** 

# **WordPress & Powerful App Platforms!**

- Supports over 140 popular apps including WordPress, Drupal<sup>™</sup>, Joomlal<sup>™</sup>, TYPO3, and more
- Security & version upgrade notifications
- Trial version available for all applications
- App Expert Support
- 1&1 CDN powered by CloudFlare<sup>TM</sup> and 2 GB guaranteed RAM for peak performance

#### **Powerful Tools**

- PHP 5.5, Perl, Python, Ruby
- 1&1 Mobile Website Builder
- NetObjects Fusion® 2013 included

## Successful Marketing

- Facebook® advertising credits
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# Supermicro C7X99-0CE

uilding a rig based on Intel's Haswell-E B processors can be pricy, as the cheapest of Intel's new CPUs retails at just under \$400. And of course, the X99 chipset also introduces support for DDR4 memory, so you won't be able to simply harvest memory from an X79 or another existing system. A sparkling new SSD and top-of-the-line GPU might be part of your plan, too. With such a big investment, you'll want to make doubly sure that the motherboard you select delivers rock-solid reliability. With roots in the enterprise and server markets, Supermicro is in the business of reliability. The C7X99-OCE is Supermicro's first motherboard for the X99 chipset; it's built to last, but it's also so much more.

Most X99-based motherboard support CPU and memory overclocking, but Supermicro brings some special sauce to the mix. Impressively, the C7X99-OCE can handle up to 64GB of DDR4 clocked up to 3,300MHz. There's even a dedicated M button on the motherboard to let you trigger a custom DRAM overclock you've set up in the BIOS.

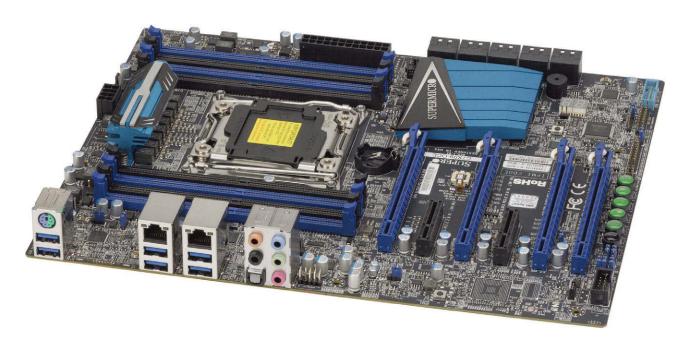
You can also overclock your processor at the touch of a button, thanks to the OC1, OC2, and OC3 buttons on the motherboard. The OC1 button will bump the CPU speed by 15%, while the OC2 button goes even further, with a speed increase up to 25%. The third OC button will load a custom overclocking configuration stored in the BIOS. If any of the overclocks causes instability, you can quickly return to default BIOS settings by pressing the onboard Home button. A LED digital readout is also available to help you troubleshoot any problems.

Overclocking in the BIOS is a breeze, thanks to the well laid out AMI graphical interface. There's a comprehensive Overclocking section with drop-down menus, so it's easy to quickly select the frequencies and voltages you want to use. If you want access to more detailed settings, there's an Expert Mode button (in the Overclocking window) that lets you drill down to the various voltage, ratio, and frequency options. BIOS management options are also available to set up boot, I/O, and chipset configurations.

Similar to most X99 motherboards, the C7X99-OCE supports 4-way SLI and CrossFire configurations. If you opt for a Haswell-E processor that supports 40 PCI-E lanes (the Core i7-5960X or Core i7-5930K), the C7X99-OCE can run four GPUs at x16/x8/x8/x8 speeds. while a set of three GPUs operates at x16/x16/x8. If you use the Core i7-5820K, which is limited to 28 PCI-E lanes, the motherboard will disable one PCI-E x16 slot and one PCI-E x4 slot, limiting you to a 3-way GPU setup and reduced lane speeds. Besides the four PCE-E 3.0 x16 slots, Supermicro also provides you with two PCI-E 2.0 x4 physical slots that are wired at x1 speeds.

Connectivity options on the C7X99-OCE are what you'd expect from an enthusiast board. You'll find 10 6Gbps SATA ports, six of which support RAID 0, 1, 5, and 10 configurations. There are eight USB 3.0 ports (six rear, two internal), as well as a PS/2 port for connecting system peripherals. The C7X99-OCE supports surround sound audio with an optical S/ PDIF output, and analog audio I/O ports are available, as well. For networking, you'll find two Gigabit Ethernet ports utilizing Intel's I210-AT controllers.

Compared to some of the X99 motherboards we've reviewed, the





C7X99-OCE \$299 Supermicro www.supermicro.com

C7X99-OCE offers a minimalist layout, which can be a good thing. There are no bright LEDs or a large, clunky VRM heatsink, which is helpful for builders who want a motherboard that won't distract from the other design elements inside a case. The slim heatsinks might also be advantageous to power users implementing large CPU coolers or radiators that extend over the VRM section of the motherboard, because you shouldn't have any clearance issues. Supermicro does provide an attractive color scheme of blue and black throughout the slots and heatsinks. We also like that Supermicro fits the C7X99-OCE into the ATX form factor, as many of the X99 motherboard's we've reviewed use the E-ATX size that can limit your choice of cases.

We ran the C7X99-OCE through our benchmarks on a test system that included

2400; Storage: 240GB OCZ Vertex 3 MAX IOPS SSD; OS: Windows 8 Pro (64-bit)

an Intel Core i7-5960X, a ZOTAC GeForce GTX 980 AMP! Extreme Edition, and 16GB of Crucial Ballistix Sport DDR4-2400 memory. As expected, the motherboard had no trouble. For example, over the system exceeded 60fps in Aliens vs. Predator at 2,560 x 1,600 with all settings on high (4XAA, 16XAF). The Intel Core i7-5960X shows its chops with great results in Cinebench 15 (1334 points) and POV-Ray 3.7 (2775.65 pixels per second). The system also did well in PCMark 8's Creative test, with an overall score of 4986. Benchmark results were solid in all other tests.

Supermicro is still relatively new to the enthusiast market, but with each new release, its motherboards include more features for power users, such as the one-touch overclocking buttons and intuitive BIOS. Support for DDR4-

Benchmark Results	Supermicro C7X99-OCE
3DMark Professional (Fire Strike Extreme)	6414
Graphics Score	6630
Physics Score	16129
PCMark 8	
Creative Score	4986
SiSoftware Sandra 2014 Lite SP3	
Dhrystone AVX2 (GIPS)	296.64
Whetstone AVX (GFLOPS)	175.62
Multi-Media Integer AVX2 x32 (Mpixels/s)	434.27
Multi-Media Long-int AVX2 x16 (Mpixels/s)	193.3
Multi-Media Quad ALU x1 (Mpixels/s)	3.35
Integer B/F AVX/128 (GBps, mem bandwidth)	45
Floating B/F AVX/128 (GBps, mem bandwidth)	45.63
POV-Ray 3.7 Beta*	2775.76
Cinebench 15**	1334
Games (2,560 x 1,600)	
Metro: Last Light (16XAF)	58
Aliens vs. Predator (4XAA, 16XAF)	62.1
* pixels per second	
** points	

3300 is impressive, too. The high-end overclocking capabilities ensure that the C7X99-OCE won't be the part that limits your final overclock. ■

BY NATHAN LAKE

Specs: Max memory: 64GB DDR4 (DDR4-2133; Max OC: DD4-3300); Slots: 4 PCI-E x16, 2 PCI-E x4 (runs at x1 speed); Storage: 10 6Gbps SATA; Rear I/0: 6 USB 3.0, 1 optical S/PDIF out, audio I/0, 2 Gigabit Ethernet, 1 PS/2; Form Factor: ATX; Warranty: 3 years

Test system specs: Processor: Intel Core i7-5960X; GPU: ZOTAC GeForce GTX 980 AMP! Extreme Edition; Memory 16GB Crucial Ballistix Sport DDR4-



# **ZOTAC GeForce GTX 980 AMP! Extreme Edition**

ast month, we ran three GeForce GTX ■980s through their paces and came away quite impressed with the performance, cooling, efficiency, and value from EVGA, PNY, and ASUS. This month, ZOTAC sent along its flagship GeForce GTX 980 AMP! Extreme Edition, and it brings with it a number of unique features. Although they're late to the party, we'll see if their custom GTX 980 has what it takes to push your gaming experience into much prettier territory.

The exterior of this card features three fans shrouded in what ZOTAC is calling Carbon ExoArmor, which looks like a striped grey plastic exoskeleton framed by matte black plastic. There's a large LED-lit window on the top edge of the card and another two LEDs accenting the right and left most fans. Those LEDs are tied to ZOTAC's LIGHT.id reactive LED lighting system, which pulses green when the GPU is idle and turns red under load.

On the back bracket, you'll find a duallink DVI, one HDMI, and three full-sized DisplayPort outputs. In the box, ZOTAC packaged a case sticker, a pair of 8-pin PCI-E power adapters, a VGA adapter, and a cable that links the OC+ module on the back of the card's PCB to your motherboard's internal

USB header to deliver real-time performance data. We also like that this card has a backplate—more of the Carbon ExoArmor that covers most of the PCB. As the bundled adapters imply, this card requires two 8-pin PCI-E power connectors to operate.

The 28nm Maxwell GPU under the hood of this card has a total of 16 SMMs and 2,048 CUDA cores, 128 texture units, 64 ROPs, and a 256-bit memory bus that lets the GPU access a 4GB pool of 7GHz GDDR5.

The base and boost clocks on the stock version of the GTX 980 are 1,126MHz and 1,216MHz, respectively. But one of the reasons ZOTAC equipped this card with such a hearty cooler and the extra power was to push those clocks significantly higher. As a result, the core clock is 1,291MHz, and the boost clock is 1,393MHz. Even the memory clock got a bump, from 1,752MHz on the stock GTX 980 to 1,800MHz.

Last month, it was sky-high core and boost clocks that carried EVGA's GTX 980 Superclocked ACX 2.0 on to victory in the benchmarks. ZOTAC manages to surpass that card's clocks by 25MHz (core), 26MHz (boost), and 48MHz (memory), so as you could've guessed, that effort earns

Specs & Scores	ZOTAC GeForce GTX 980 AMP! Extreme Edition	
Price	\$609.99	
Core clock	1,291MHz	
Boost clock	1,393MHz	
Memory clock	1,800MHz	
Memory interface	256-bit	
Memory	4GB GDDR5	
3DMark Professional (Fire Strike Extreme)	6445	
Graphics Score	6695	
Physics Score	16109	
Unigine Heaven 4.0	(1,920 x 1,200)	
Score	1560	
FPS	61.9	
Games	(1,920 x 1,200)	
Metro: Last Light (16XAF)	88.67fps	
Aliens vs. Predator (4XAA, 16XAF)	100.5fps	
	(2,560 x 1,600)	
Metro: Last Light (16XAF)	55.67fps	
Aliens vs. Predator (4XAA, 16XAF)	62.4fps	

them the top spot among all the GTX 980s we've tested. Standout scores include a 6,445 3DMark Fire Strike Extreme score, a 100.5fps AvP score (1,920 x 1,200), and a 55.67fps Metro: Last Light score (2,560 x 1,600).

If you're looking to pick up a factoryoverclocked GTX 980 that still has the headroom to take your games to the next level, then the AMP! Extreme Edition is the card for you.

BY ANDREW LEIBMAN

Test system specs: Processor: Intel Core i7-5960X; Motherboard: GIGABYTE X99-Gaming G1; RAM: 16GB ADATA DDR4-2400; Storage: 240GB OCZ Vertex 3 MAX IOPS SSD; OS: Windows 8 Pro (64-bit)



**TORQ X10 Carbon** \$79.99 EVGA www.evga.com

# **EVGA TORQ X10 Carbon**

aybe more than any other peripheral, gaming mice are tough to get right, and almost impossible to perfect. Should you keep the mouse sleek and minimalist, but risk alienating the macro maniacs who need 15 specific actions each bound to their own button? Do you appease the max-buttons crowd but inadvertently make a mouse with so many poorly placed buttons that the end result is clumsy and awkward? Claw or palm grip? Ambidextrous or righties-only? Any way you slice it, you ruffle someone's feathers/ start a holy war on Twitter.

EVGA aims to please, though, and the company's TORQ X10 Carbon is going to make a lot of gamers happy. There will be detractors, sure; that's how this game is played—haters gonna hate. For everyone else, the TORQ X10 is a high-performance mouse that is also highly tweakable. As we do so often, let's tweak.

The TORQ X10 Carbon is extremely comfortable because it becomes extremely comfortable: You can adjust several of its physical properties. A Torx

screw at the heel of the mouse lets you make the arch in the palm rest more or less pronounced, according to how your prefer to grip your mouse. According to EVGA, this lets you adjust the mouse's height by a full quarter-inch. It's a difference you'll definitely be able to feel.

You're also able to pry off the top of the main left and right mouse buttons to expose the TORQ X10 Carbon's custom weight system. A pack of six cylindrical weights is included with the mouse, and you can mix and match them to adjust the mouse's weight from 121 to 134 grams. And, as an ambidextrous mouse, the TORQ X10 Carbon doesn't immediately disqualify 10% of the population simply by virtue of their handedness.

Button hounds should be pleased with the TORQ X10 Carbon's nine programmable buttons. There are two on either side of the mouse, plus the main right and left buttons, scroll wheel, and a pair that by default adjust the DPI on the fly. The main buttons use Omron switches that are both lightning-fast and long-lasting. Add to this an Avago 9800

laser sensor (8,200 max DPI) and low-friction PTFE feet, and you'll believe us when we say that the TORQ X10 Carbon handled its business in the games that we tested it with. The buttons are fully customizable, and you can save your macros to five profiles.

Visually, the TORQ X10 Carbon certainly looks the part. EVGA swathes the sides with carbon fiber (hence the "Carbon" portion of its name; if carbon fiber isn't your can of Red Bull, EVGA offers the TORQ X10 for \$10 less), and you can also change the color of the mouse's LEDs. Choose from red, green, blue, yellow, orange, pink, or purple.

Above all else, a gaming mouse has to feel good in your grasp. The TORQ X10 Carbon does. After that, you want it to have quality components. The TORQ X10 Carbon does. For a company known primarily for its graphics cards, EVGA makes a mighty fine, mighty mouse.

BY VINCE COGLEY

# Giving New Life To Custom Lighting

# Q&A With Just A Bunch Of Geeks (

: Just A Bunch Of Geeks is launching the Guardian Hardware Monitor and Spectrum fans on Kickstarter. What are they?

**PR**: For well over a decade, LED lighting has been a one-horse show. One color, on or off. Boring. Spectrum fans have RGB and addressable LEDs that give real life to a custom build. Guardian is an LED controller that can cue color changes and impressive strobing effects to CPU and GPU load/temp changes, in-game events, and even music. It also supports UV, RGB, and even addressable LED strips.

# : How did you come up with the design for the Guardian, and what were your initial goals for it?

**PR**: When we were designing a custom case, we knew we would need a really cool fan controller. When the coolest one we could find failed after just two hours of testing, we knew we could not rely one anyone but ourselves to do it right. We also understood that we could not design any old fan controller and hope to compete in an already crowded market. We had to get way out there, do something no one else was doing. Controlling LEDs on fans with a controller-no one was doing anything close to that, so that's what we went for. We also didn't want anyone following us six months later with something a little better, so we loaded in every feature we could into our fans. We went geek all the way.

# : As you mentioned, the Guardian has some competition. What sets it apart?

**PR**: There are other fan controllers, sure. But Guardian offers a fullcolor TFT LCD display with 480 x 272dot resolution, about the same as the original iPhone, and a truly customizable user interface. However, the real magic with Guardian is that it allows users to download,



To learn more about the Guardian or get involved via Kickstarter, visit kck.st/1A8SMgl.

modify or create, and share truly impressive custom lighting effects, select any colors they want and associate cues from the OS, ingame events and even music to create effect sequences. It is just so off the hook. No one competes with us. And this was our intention from the beginning.

# : Tell us about the Kickstarter. Does this approach to funding also change your approach to design or manufacturing?

R: Absolutely yes, for a number of reasons. First, as a startup, you don't



have any kind of management bureaucracy telling you to cut corners or saying, "No, that's too much." Basically, if we could add a feature and it didn't cost us much in the way of components or serious complexity, we did it. Also, crowdfunding means that you're making a social commitment to the people who will be using your product. They are not going to walk into a store and get it from a third party. You send it to them, they are going to call you to compliment, suggest changes, or complain, and that definitely guides your decisions during planning, design, and manufacturing.

# : Does Geeks have other products in the works?

**PR**: Oh yes! A Wi-Fi router with a user-friendly interface and some really cool hardware features I'll talk more about this summer. As geeks, we really like to have a lot of features, but we also like stuff that is smart and doesn't require a Ph.D. to set up advanced configurations. Why does every router have such a terrible user interface? Setting up a Wi-Fi bridge should be as easy as pairing a Bluetooth device to your phone.

We also want to make a Geek PSU to work with Guardian. Many modders want to see how much power their rig is using. That's really hard to see without special hardware support from the PSU. With Guardian, that could be very easy. There are digital PSUs on the market now that could work with Guardian with just a software hack. We plan to approach a particular manufacturer and discuss cooperation after we get funded. We hope they will agree, but we are ready to work on our own line of PSUs.

# : Where do you see Just A Bunch Of Geeks in five years?

**PR**: I would really like to see us get back to designing really interesting cases and eventually become a boutique computer brand (perhaps like Alienware) that also sells top-grade hardware components.



# Tt eSPORTS TALON \$19.99 Thermaltake usa.ttesports.com

# Thermaltake Tt eSPORTS TALON

G reat gaming mice often cost \$50 or more, so you might see the \$19.99 price tag on the Thermaltake TALON and dismiss it as a basic, budget mouse. That would be a mistake, because this mouse is teeming with features found on pricier gaming mice. For example, there's a dedicated DPI button that lets you quickly cycle through the mouse's five DPI presets. Changing the DPI on the fly is ideal for FPS games where you frequently switch weapons, moving from a low sensitivity for sniper duty to a high sensitivity when it's time to break out the rocket launcher. This gaming mouse has quite a few more tricks to show off, too.

Above all, a gaming mouse must be precise. The TALON comes with an Avago 3050 optical sensor that doesn't use prediction, meaning it won't "correct" mouse movements by straightening the cursor path. The lack of prediction is a major benefit for gamers, because the TALON will accurately represent mouse movements, even those that are extremely fast.

When you're flying from one DPI level to the next, having a visual cue to determine

your mouse's current sensitivity confers a crucial advantage in the heat of battle. This is just another perk of the TALON, as the mouse has a specific color of illumination tied to each DPI preset. The color coding is as follows: red for 500dpi, yellow for 750dpi, blue for 1,500dpi, dark blue for 2,500dpi, and purple for 3,000dpi (which is also the TALON's max DPI).

You'll also have control over the TALON's LED lighting when not switching the DPI. In addition to the previously mentioned colors, orange is another option. A series of translucent veins run lengthwise across mouse's body, and when the TALON's LED light shines through, the effect is unlike anything we've seen in a mouse. You can also configure the TALON to cycle through all the colors or you can disable the lighting effects altogether, if bling ain't your thing.

The mouse's ambidextrous shape was comfortable during gaming sessions. In particular, we liked the wide palm rest, because it provided plenty of control when using a palm grip. Thermaltake also lets you change the shape of the mouse by removing the side panels. Gamers that use a claw or fingertip grip might find the slimmer profile to be more comfortable. Thermaltake uses OMRON switches rated with a 5 million-click life cycle. In our testing, the buttons were very responsive.

There are six buttons on the TALON, including the main left and right buttons, scroll-wheel, DPI button, and two buttons near the thumb rest. Thermaltake uses a thick, braided nylon cable that both protects the USB cable from damage and reduces the chance for tangles. The cable itself is 4.9 feet long, so you'll have plenty of slack.

The TALON might not have every feature found on a flagship gaming mouse, such as oodles of macro buttons and a custom weight system, but it does deliver excellent accuracy, easily adjustable sensitivity, and customizable lighting. We also like that you can modify the mouse's shape to suit your grip style. In short, Thermaltake proves that a big price tag isn't necessary for a quality gaming mouse.

BY NATHAN LAKE

Specs: Sensor: Avago 3050 optical (3,000dpi max); Body type: Ambidextrous, 6 buttons; Switches: OMRON; Interface: USB; LED lighting options: 6 colors or cycling effect; Cable length: 4.9 feet; Warranty: 2 years



# Aerocool XPREDATOR CUBE RED EDITION

When it comes to your chassis, if you Vchoose poorly, you'll end up with an eyesore that's cramped for space, difficult to upgrade, and cooling-impaired. As masters of airflow, Aerocool has managed to imbue the XPREDATOR CUBE with a multitude of flexible cooling options and a unique sense of style.

The XPREDATOR CUBE RED EDITION is a good deal wider than your standard case, but it's also a bit shorter than your average mid-tower. The case is a painted black steel frame with plastic top and front panels. The front panel features a large, foambacked, metal mesh plate below a 5.25-inch external drive bay cover. The vent-like design

elements on either side of the mesh grille are purely cosmetic, but we like the splashes of red. At the top of the front edge of the case is where you'll find a pair of fan controller knobs and USB 3.0 ports, as well as mic and line-in jacks. There's also two red LED-lit bars on either side of the front panel. The top panel is a black plastic frame with red plastic louvers that snap open and shut via a red slider. Between these vents and the front panel is a rubber-lined storage tray adorned with a large Aerocool logo.

Like Aerocool's other "cube" chassis, the XPREDATOR CUBE features a horizontal microATX motherboard tray. The side panel has a half-window that makes the

graphics card the main attraction, which makes sense for gamers because it's the component they're typically most proud of. There is about 12.6 inches of clearance for a particularly long graphics card, or up to 13.6 inches if your remove the case's front fan. Internally, the case is essentially split in two, with the PSU and storage drives in the bottom half, and the motherboard, CPU, graphics card, and other components in the top half. The motherboard tray, mesh expansion bracket covers, and HDD/SSD drive trays are all red. Both the storage drive cage and the motherboard tray are removable, which makes installing each component that much easier. We also like the rubber grommeted holes and the large CPU cutout in the motherboard tray.

Cooling options abound in the XPREDATOR CUBE. The case ships with a massive 200mm fan in the front panel that is capable of drawing air in and pushing it across both halves of the system. The back panel also features a 140mm fan installed behind the storage drive cage. Those with liquidcooling aspirations can fit a 120mm or 240mm radiator (in the latter instance, only if the ODD bay is removed) in the top panel, and it's the same story for the front panel. A 120mm radiator will also fit into the back panel and double as the case's exhaust fan. Aside from the foam and mesh, the side panel closest to the vertical PSU has a magnetic dust filter to help keep your internal components clean.

If you're in the market for a mATX enclosure with practically limitless cooling options and a sharp aesthetic, then the XPREDATOR CUBE RED EDITION is an obvious contender.

BY ANDREW LEIBMAN

XPREDATOR CUBE RED EDITION \$119.99

> Aerocool www.aerocool.us

Specs: Dimensions: 16.5 x 11 x 16.2 inches (HxWxD); Materials: Steel, plastic, metal mesh; Motherboard support: microATX, Mini-ITX; Bays: 1 5.25-inch external, 3 3.5/2.5-inch internal; Fans (included): 1 200mm LED front, 1 140mm rear; Fans (optional): 2 120mm/140mm front, 2 120mm/140mm top, 1 120mm/140mm rear; Ports: 2 USB 3.0, audio I/O; 2-channel fan controller



# **GIGABYTE**







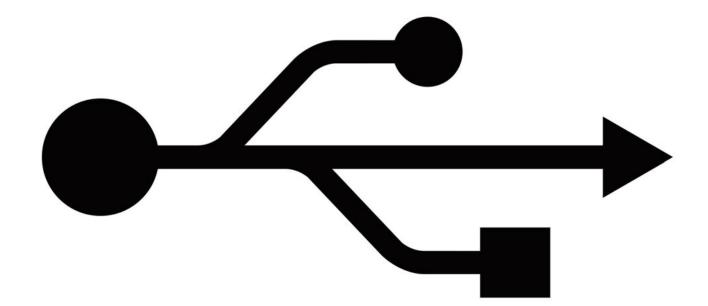




**GIGABYTE X99 Series Motherboards** 



# State-Of-The-Art Standards



hen it comes to PC-based standards, USB is the big one. It was introduced in 1996 and has gone on to become the dominant standard used to connect and power a multitude of external PC peripherals, including mice, keyboards, printers, scanners, game controllers, webcams, and external storage devices. It's also become the de facto protocol for charging and transferring data to and from smartphones, tablets, digital cameras, and camcorders. Gaming consoles and handhelds use it for connecting controllers, GPS devices get map updates with it, and it's used to power everything from beverage warmers to foam dart turrets and countless components on computing's periphery. Read on to discover its humble beginnings and learn about the latest

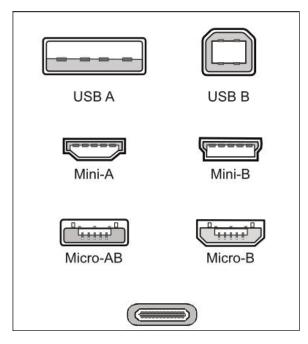
and most powerful version of USB, version 3.1.

# **Port Origins**

Prior to the dawn of the USB era, there were a trio of standards used for peripherals, including PS-2 (mice and keyboards), parallel ports (printers and scanners) and RS-232 serial connections (mostly for modems). It was not easy to expand the number of available ports using these protocols. If you wanted another parallel or COM port, you had to open the PC and install an expansion card. Performance was another big limiting factor for early PC peripherals using these interfaces. RS-232 serial and parallel port throughputs topped out at 251Kbps and 965Kbps, respectively.

When speed and flexibility began to become a problem for the burgeoning PC industry, a consortium of companies came together to create one standard to rule them all. USB's initial specification was drafted using feedback from many of the heavy hitters in the industry at the time, including Compaq, DEC, IBM, Intel, Microsoft, NEC, and Nortel. The joint goal was to produce a standard that could be used to transfer data between PCs and peripherals faster and at a lower cost to component, PC, and peripheral makers.

USB consists of a host-based architecture, which is capable of supporting multiple peripherals, in a tiered-star topology. The host controller has a built-in hub, called the root hub, that centrally manages the individual devices and auxiliary hubs connected to it. Unlike the competing FireWire technology (a



USB-based devices support a variety of connector types.

peer-to-peer protocol), the USB host controller relies on the CPU and software for its processes. While this puts additional strain on the system, it makes USB cheaper for chipset makers to implement.

The specification calls for the potential connection of up to 127 devices, via multiple hubs, to a lone host controller. This seemingly impractical number of supported devices comes from the fact that the each data packet transmitted by a USB device has an ADDR (address) component that is 7 bits in length. Each bit can be represented by either a 1 or a 0, resulting in 27 as the number of potential devices. Because no device can have an address of all zeroes (this is the address reserved for unassigned devices), there's one less than 128 possible, hence 127. In reality, power limitations and a variety of software conflicts may prevent you from running so many devices from a single USB controller.

#### **Power Plug**

The ability of a low-powered USB device to draw power from the USB

port is another of the specification's defining features. USB is capable of delivering between 500mA for up to 2.5W (USB 2.0) and 900mA for up to 4.5W (USB 3.0) to a single port for powering the connected device. But regarding hubs, the power gets divided up among subsequent ports when more than one device is connected. For example, a bus-powered USB 2.0 hub with four ports will only be able to offer 100mA to each connected device, which is simply not enough to run some devices. Independently powered USB hubs can supply

the full 500mA/900mA to each device connected. Some USB devices also include dedicated power supplies or a second USB port to account for a higher-than-typical power draw. The latest version of the specification adds even more power to the winning USB formula. USB 3.1 devices will be able to draw as much as 5,000mA for up

to 100W of power from the USB controller. Soon you may be able to put a USB-powered pizza oven next to that beverage warmer.

#### **Connector Shapes**

Another of USB's defining characteristics is its support for different connectors on each end of the cable. For instance, the connector that goes into the USB port on the PC or notebook is most often a Type A connector, which is a narrow rectangle. Variations of the host-side Type A connector for small form factor devices include Mini-A and Micro-A. The device end of the USB cable will often differ in shape to the host end. The standard Type B connector, most often found on printers, is a square with tapered corners on the top side, but Mini-B and Micro-B connectors are also available for smaller devices. Most current smartphones, for instance, use a Type A at the host end and a Micro-B at the device end.

The latest connector, predictably called Type C, will debut alongside USB 3.1-certified devices that are due to arrive in early 2015. This is a much smaller connector, similar to the popular Micro-B, but it's reversible, so you'll never find yourself fumbling to align the



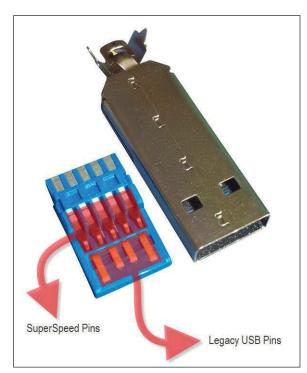
Powered USB hubs let you connect and charge multiple devices simultaneously.

open part of the connector to the closed part of the port. The rectangular Type C connector is 8.35mm wide, 2.8mm tall, rounded on both sides and tapered at the end to make it easy to insert. It has a metal reinforced tongue and an internal latching mechanism to keep cables in place. But let's not get ahead of ourselves, USB's first incarnation didn't exactly set the world on fire.

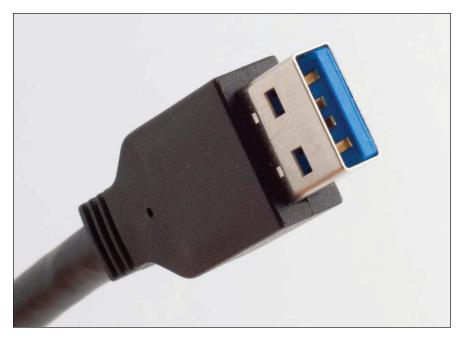
#### **USB 1.0**

The earliest work on USB started in 1994, which predates the 3dfx Voodoo graphics accelerator, Windows 95, and Sun Microsystem's Java. USB went through several revisions between November 1994 and November 1995 when the USB 1.0 release candidate was announced. Two months later, the final spec called for an interface capable of operating in two modes, Low Speed (1.5Mbps) and High Speed (12Mbps).

The lack of support for extension cables and pass-through monitors initially limited USB 1.0's appeal, but Microsoft added



The five USB 3.0 pins reside deeper inside the connector than the four legacy USB pins.



USB 3.0 ports and connectors commonly use blue connectors to differentiate them from older USB ports.

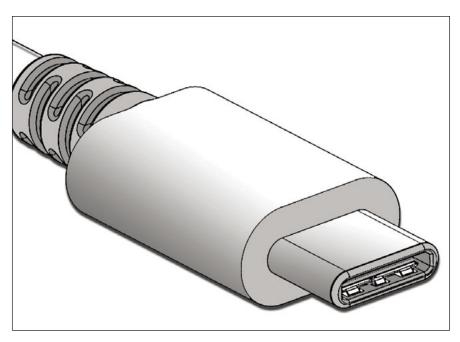
support for the specification to its OEM Service Release 2.1 and 2.5 updates for Windows 95, which came out in August of 1996.

> In 1998 USB 1.1, or fullspeed USB, became the first revision of the specification to see widespread adoption. Windows 98 Second Edition saw the fullest implementation of the standard yet. Although Win98 initially supported USB composite devices (such as webcams with built-in microphones) at launch, it wasn't until Win98 SE that USB audio device support was added. Win98 SE also came with better WDM (Windows Driver Model) support, which was Microsoft's new device driver framework at the time and a vital piece of the peripherals puzzle.

#### **USB 2.0**

Toward the end of 2001. the USB Implementers Forum (USB-IF) ratified USB 2.0, which brought a 480Mbps data rate to the specification, which was a 40-fold increase compared to USB 1.1. USB 2.0, dubbed High-Speed USB, added several new features over its lifespan. One such feature is USB-On-The-Go, which allows two USB devices to communicate without being connected first to a USB host device. Another advancement was the Battery Charging Specification, which let device makers ship power supplies with USB connectors. The Battery Charging Specification also paved the way for USB sleep-and-charge ports, which are specialized USB ports that let you charge USB-based devices even when the host device (such as your PC) is turned off.

Under USB 2.0, the specification established itself as the de facto interface for computers, peripherals, consumer electronics, and more. The USB Implementers Forum (USB-IF) recently estimated that USB's installed base is well over 10 billion products, with shipments exceeding 3 billion devices a year, including a billion or more mobile phones and over 150 million USB flash drives. But to keep that momentum going, USB needs to



The new Type C connector is reversible. It only took 20 years . . . .

continue to speed up as peripherals demand more from the protocol.

#### **USB 3.0**

SuperSpeed USB is the latest revision of the Universal Serial Bus standard that brings theoretical transfer rates of up to 5Gbps, more power, quicker recharging for energy-demanding devices up to 900mA, new power management features, and, of course, backward compatibility with USB 2.0 devices.

In September 2007, the chip giant Intel and other industry heavyweights, including HP, Microsoft, NEC, NXP Semiconductors, and Texas Instruments, formed the USB 3.0 Promoter Group to develop a faster USB. In November 2008, the group finished their work and released the 1.0 revision of the specification. Following the release, the USB-IF took over the development and product certification duties for the new bus standard. Fast-forward to late September 2009; NEC launched a USB 3.0 host controller, which was the first product to receive the USB-IF's stamp of approval and was subsequently integrated with the motherboards in notebook and desktop PCs. SuperSpeed

USB-capable devices arrived on store shelves in force in early 2010. Adoption of SuperSpeed USB outpaced that of USB 2.0, and in 2012, both AMD and Intel introduced chipsets that support USB 3.0 natively. Today, several USB 3.0 ports are available on all of Intel and AMD's current chipsets.

There are a couple of factors that enable SuperSpeed USB (and its eventual tweaks in version 3.1) to achieve sky-high data transfer rates, the first of which is a complete redesign of the standard's ports, connectors, and cables to support higher data throughputs. Each USB 2.0 connector and cable features four pathways that correspond to power, ground, and a pair for data. USB 3.0 ports and cables utilize an additional five pathways that take the form of another ground and two more pairs dedicated to data transmission. SuperSpeed USB's asynchronous signaling method enables full-duplex (the ability to send and receive data at the same time) communication. Another speed-booster comes in the form of SuperSpeed USB's optional fiber optic pathways, compared to the older standard's copper.

The SuperSpeed USB connectors and ports have been cleverly designed so that the five USB 3.0 pins coexist with the four legacy USB 2.0 pins, enabling full backward compatibility. Remember, there are three components in a USB connection, the port on the PC or notebook (and the corresponding controller), the cable itself, and the USB device. If any of these is USB 2.0 or 1.1, the performance will default to the slowest standard's speed.

USB is arguably one of the most successful interface standards in all of computing, but SuperSpeed USB's arrival had some observers asking if USB 2.0 (and its peak raw data rate of 480Mbps) wasn't already fast enough. For many peripherals, the answer was yes, but SuperSpeed USB's killer apps won't be thumb drives in the shapes of cartoon characters. External hard drives, high-definition webcams, displays, 4K video, digital camcorders and cameras, multi-channel audio, and external media drives such as Blu-ray players are all prime candidates for a USB 3.0 connection. These applications are at the cutting edge of modern computing, and even USB 3.0 may not be able to keep up with them all.

#### USB 3.1 & Beyond

SuperSpeed USB 10Gbps (or USB 3.1) effectively doubles the USB 3.0 data rates to, you guessed it, 10Gbps. The update will remain backward compatible with existing cables and connectors and bring with it improved data encoding and I/O power efficiency. According to the USB 3.0 Promoters Group, the SuperSpeed USB 10Gbps specification was completed in July 2013, and work on the aforementioned Type C connector was completed in August 2014.

Given the success of USB up to this point, including the most recent speed boost via USB 3.0 and 3.1, it's clear that high-bandwidth applications and USB are a match made in heaven. In 2014, almost 20 years after its initial iteration, USB is still helping to create new and interesting things that plug into our PCs and notebooks. This is one protocol that shows no signs of slowing down.

# In The Loop

# Watercooling Wow Factor



Fact: You can set up a custom liquid-cooling loop and do nothing else, and that custom loop will instantly look a zillion times better than your CPU's and graphics card's humdrum stock cooling. Condolences to the drab, chunky aluminum heatsinks and blocky shrouds, but never in the entire history of LAN parties have they turned a single head. Sleek waterblocks and towering reservoirs—those command attention.

Second fact: With the right gear, some creativity, and proper planning, you can visually enhance your watercooling and create something that no power user or modder has ever done. Eyes will bulge; jaws will drop. Trophies and prizes rain down. Sponsors court you with mountains of phat lewt in the hope that you'll choose their hardware to feature in your next masterpiece.

Maybe we're getting a little ahead of ourselves. Let's forget about the mod contests and corporate sponsorships for a moment. You want to take your liquid-cooling setup to the next level, put your stamp on it? You've come to the right place. EK's Derick Magnusen naturally knows his way around the company's hardware, and he sat down with us to share a few tips to trick out your loop with your own style.

#### Color, Coordinated

The days of green PCB are ancient history. Black PCB rules now, and motherboard manufacturers accent their wares by coloring mobos' VRM and PCH heatsinks with red, gold, blue, etc. The easiest, most sensible way of making your liquid-cooling setup pop is to play off your components' existing color scheme.

"To turn a loop into a work of art, probably the best place to start is color coordination," Magnusen says. "Luckily, motherboard manufacturers like GIGABYTE are making this easier and



When you're ready to go the extra mile, full-board waterblocks with clear Plexi tops like this EKWB pair for ASUS' RAMPAGE V EXTREME can make a dramatic visual statement.

easier by offering multiple colors for each motherboard generation."

You can solve the color-matching equation a couple of different ways. Perhaps the simplest approach is picking tubing that shares a color with your system's hardware. But for some real excitement, clear tubing might be your best bet. In addition to EK's already large family UV-reactive and standard-colored coolants, EK recently introduce a brand-new selection of pastel Ekoolants. When so many vibrant colors are available for coolant, clear tubing is the way to put them on display. The second reason, which we'll cover in more depth in a moment, is that EK has a whole host of clear cooling parts that can showcase the tinted coolant as it surges through your loop.

#### Gear Up

Coolant and tubing are only the beginning. The real fun begins when you

build the rest of your loop around your artistic vision. EK's clear Plexi tops are like side panel windows for your waterblocks: You see right through them to watch all the magic happening within. And with the right motherboard, EK can hook you up with custom, clear Plexi waterblocks for your board's VRM and PCH, too.

Full-cover waterblocks are your best bet to class up your graphics card(s). Clear Plexi tops that run the length of a graphics card put your coolant on full display, and you can add to the effect by pairing the block with one of EK's full-cover backplates. Depending on your graphics card model, you can choose from several colors; failing that, a full-cover backplate in a black or nickel finish is infinitely better-looking than a graphics card's exposed PCB.

If you only have one graphics card, you can really go wild. Magnusen suggests using a PCI-E extender that flips the orientation

of the graphics card so that its waterblock runs parallel with a case's side panel, making it easy to see through a side panel window. Of course, this will require a little case modding in order to properly secure the graphics card to your chassis.

Your loop's waterblocks are the stars, but to really elevate your loop's aesthetics, a solid supporting cast is also necessary. For starters, accessories such as the EK-D5 Cover Kit and EK-DDC Heatsink Housing are options you can use to give your loop's pump a brand-new look. You'd also be surprised at the difference EK-HDC fittings can make when matched with the rest of your rig.

# A Modded Masterpiece

Although EK has a stockpile of hardware designed for the sole purpose of making your system look awesomer, there are all sorts of projects to go even further. You'll need tools, as well as some modding know-how, but once your skills are sufficiently leveled up, try some of these ideas.

Depending on the radiator, you can remove its shroud and give the shroud a new coat of paint. Magnusen says that EK's EK-CoolStream PE radiators are built with removable shrouds in order to make applying a custom paint job much simpler. This will, however, void the radiator's warranty, but

# EK Modder Of The Month: Malik

Prolific modder Łukasz Płonka, aka Malik, knows a thing or two about ultra-clean, eye-catching builds. When working with a case with glass side panels, like Płonka's radical savagePROJECT, the margin of error for having stunning internals is precisely zero.



That didn't stop Płonka, though, especially with regard to savagePROJECT's liquid-cooling. Replete with EK hardware, this mod catches the eye while crushing benchmarks. In this case, Płonka opted for class instead of flash, using EK's EK-FB ASUS M6I (Acetal+Nickel) CPU and motherboard combo block, an EK-FC780 GTX Ti DCII (Acetal+Nickel) GPU block, and a matching EK-FC780 GTX Ti DCII Backplate. For a full roster of savagePROJECT's parts, plus the rest of the build's cooling components, check out rog.asus.com/forum/showthread.php?53035-savagePROJECT-by-Malik.

you're probably used to a voided warranty or two if a mod like this is on your docket.

Another trendy mod, and one we've previously outlined, is swapping out your loop's flexible tubing for the rigid variety. Rigid pipe bending definitely has a learning curve, but the finished product, when done right, always justifies the time investment. "It's amazing how much clearer Plexi tubing is even compared to

the clearest plastic tubing!" Magnusen says. "We've seen some builds that have both, due to the design of the build itself, and the rigid Plexi is just breathtaking compared to the plastic tubing."

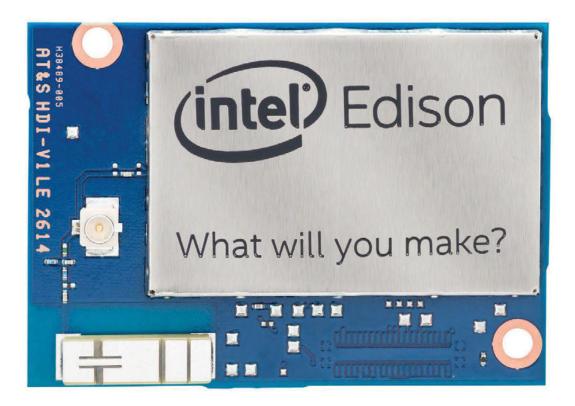
Maybe you've grown tired of the parade of cylindrical reservoirs that most liquid-cooling setups use. Why not make your own, as Richard "DarthBeavis" Surroz has been known to do? With the help of fellow modder Geno, Surroz transformed an empty bottle of Crystal Head vodka into a reservoir. He summarizes the process: "I use a laser cutter to make a stopper and tap with G1/4 threads. You can make your own with a nice scroll saw for the acrylic. I use UV curing acrylic glue and then a drill and tap set for G1/4. The secret is cutting in multiple layers and then making a laminate piece using the UV glue or WeldOn 3."

# Form & Function Unite

There are some mods that emphasize obscene performance. Other mods prioritize appearance above all else. We say: Work harder. When you have so many good-looking liquid-cooling components to choose from, there's really no excuse to not make high-performance also look drop-dead gorgeous.



Imagine how sick this GeForce GTX 970 waterblock will look filled with the colored coolant of your choice.



he IoT (Internet of Things) is coming. Market research firm Gartner has predicted that by 2020 there will be 26 billion installed units, or devices of all kinds, that will be connected and communicating to make our lives better. When you consider the kinds of data that can be generated and used in a meaningful way from that many connected cars, smart buildings, medical devices, agricultural monitoring systems, and more, it quickly becomes clear that the IoT is much more than a tech industry buzzword. In many ways, the IoT may be the biggest thing since the Internet itself.

Making all that stuff work, however, requires access to some pretty serious hardware. More specifically, it requires powerful, highly adaptable computing devices that are also tiny and affordable. That's where Intel Edison comes in.

# **One Tiny Platform**

There is a rapidly growing community of people working to develop the IoT

one device at a time. And whether an inventor's goal is to change the way we track inventory, collect traffic data, make things, sell things, work, or play, one thing remains constant: Agile development demands a tight focus on the "things" in the Internet of Things. Focusing on your specific application, process, or integration is crucial, and that's what makes Intel Edison so powerful.

Intel Edison is a general-purpose platform that is designed for easy integration into IoT projects of all kinds. Measuring just 1.4 inches long by an inch wide, Edison modules consist of a 22nm Intel SoC including a 500MHz dual-core Intel Atom CPU, a 100MHz Intel Quark microcontroller, 1GB of LPDDR3 POP memory, up to 4GB of flash storage, dual-band Wi-Fi and Bluetooth connectivity, and more.

Of course, the hardware is only part of the equation, and Intel Edison comes with open firmware and supports development within a number of operating systems. Inventors also get the Intel Analytics Platform with Intel Edison modules; this suite of software tools provides seamless communication with other devices and with the cloud, lets you create rules for triggering alerts based on data analytics, and facilitates efficient collection, storage, and processing of your data in the cloud.

In other words, Intel Edison is ready to go to work right out of the box, and its extremely small size, weight, and power demands make it ideal for everything from wearable devices to smart building applications and everything in between.

That means you can spend more time perfecting your device and less time working to integrate it with other systems and with the IoT at large.

# **Get Started**

If you'd like to learn more about Edison, join the community of inventors and developers growing around the platform, or find out where you can get yours, visit maker.intel.com.

# HARD HAT AREA PC MODDER MAD READER MOD



# Project CLUNK

he majority of the mods that we showcase in "Mad Reader Mod" each month are immaculate, pristine monuments of crystal-clear acrylic, glistening metallic paint, and perfectly ordered cabling. They represent artistic energy, to be sure, but in many cases they also represent order, perfection, and perpetual newness.

Every now and then, however, we like to step outside the lines a bit and feature mods that look less like towering monuments to man's mastery of things and more like machines that are barely staving off the ravages of entropy. These mods look far from new, and that's the whole idea. The skill required to make a thing look genuinely old and worn when in fact it is not, especially to the extent of this month's mod, is considerable.

Observe Jeremy "E.E.L. Ambiense" Birch's Project CLUNK; this mod looks like it has been driven hard for years, maybe decades, and has been kept running despite a lack of workable replacement parts. The look is exactly what Birch was after when he began working on the mod, which is no surprise given the source of his inspiration in creating it.

#### I Think We've Got Some Hoon Trouble

"This project was completely inspired by the 'Mad Max' film series, specifically the first film," Birch says. "The name itself is actually lifted from a character in the film that no one would even remember, as he didn't have a speaking role. But the name quickly stuck for the project, and fits the description perfectly."

Project CLUNK represents Birch's third appearance in "Mad Reader Mod," and it's the second of the three to wear the faux-distressed look. We're starting to see a pattern here.

"Having an artistic eye, I tend to view things in a different fashion than the majority of 'normal' society," Birch explains. "There's beauty and interest in everything to me, including a pile of rusting garbage. It has personality!"

Project CLUNK began as a damaged BitFenix Outlaw. Birch says his boss handed him the case and told him to "go do something with it," so Birch did. Birch had a friend who was in dire need of a new PC, and when Birch offered to create a modded case for his build free of charge, his friend naturally jumped at the chance.

"The theme just grew organically from the ideas that came to me while looking at the pile of parts I had," Birch recalls. "With the name of the stock case model, 'Outlaw,' I knew it needed to be part of the biker gang in the movie rather than being modeled after the police force."

# **Hack Through It With This**

Birch undertook a complete renovation of the Outlaw's interior so that he could install a 360mm radiator into the top panel of the little mid-tower. He replaced the case's original front panel (which was completely torn off) with an old Lian Li panel and some scrap aluminum and other materials he found in the trash and lying around the shop. He modified the left side panel in a similar fashion. Once he'd done a complete paint job and added some graphics and stencils, he "weathered" the entire chassis.

Next, he modified his friend's PSU to match the case's look, installed a cooling system reservoir and optical drive and covered them with custom acrylic shrouds, added additional ventilation for the radiator, and added custom-built acrylic grilles throughout. He





# HARD HAT AREA PC MODDER MAD READER MOD

constructed custom-fit wiring and sleeved it to match the theme, and installed an extensive lighting system throughout that is controlled by switches Birch installed on the front panel.

Although happily, in this case, there wasn't a ton of money involved. Project CLUNK consists of an AMD A8-6600K quadcore CPU, an ASRock FM2A88M Extreme4+ motherboard, 16GB of G.SKILL Sniper DDR3-2133 memory, an ATI Radeon HD 4850, a Corsair Professional Series HX620 power supply, and of course a BitFenix Outlaw.

The cooling subsystem includes a vintage Hardware Labs Black Ice Pro radiator, a customized EK-Supreme CPU waterblock, an EK GPU block, a Swiftech MCP35X pump in a modified EK pump/reservoir combo, several green LED Yate Loon fans, and a Sunbeam Rheobus fan controller.

# I'm The Nightrider, Baby

"Any computer geek knows that having that killer rig on your desk makes you feel like a king, even if others never really get to see it," Birch says. "Thankfully, my typical mod-hermit nature has been overcome and repressed enough to allow me to post project logs for others' viewing pleasure."

Speaking of which, you can see more of Birch's work (and his Project CLUNK worklog) at TheModZoo.com; Birch is a co-founder of the site. As mentioned in last month's "Mad Reader Mod" feature, one of his next projects is a collaboration with Bill Owen on a mod inspired by everyone's favorite ore refinery hauler from "Alien."

We humbly approve.

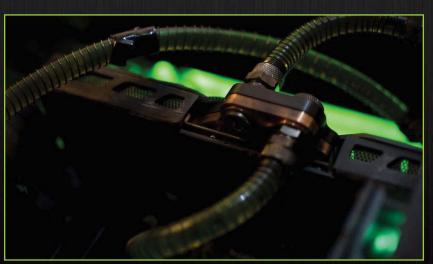
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# HARD HAT AREA PC MODDER MAD READER MOD

















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# A Tale Of Three LANs

# Intel LANFest 2014 Goes Out With A Boom (Headshot!)

Intel's LANFest series of LAN party events came to a close in November with three great LANs: LANFest Sacramento Fall 2014, LANFest Northwest Fall 2014, and LANFest NETWAR 27.0. As its name suggests, LANFest Sacramento took place in the greater Sacramento metro (in Folsom, to be precise), kicking off on Friday, Nov. 7 and running through Sunday, Nov. 9. LANFest Northwest went down in Hillsboro, Oregon (on the western edge of the Portland metro) from Nov. 14 through the 16th. NETWAR 27.0 also began at 6 p.m. on Nov. 14 and ran for 27.5 hours through 9:30 p.m. Saturday, Nov. 15 in Omaha, Nebraska.



Boasting a 400-plus seat BYOC and a wealth of contests and activities throughout the weekend, LANFest Sacramento is one of the biggest and best events on the Intel LANFest schedule. The event will apparently grow even more for Spring 2015 (date not yet determined), which is scheduled to have 456 seats.



Formerly known as LANFest Portland, LANFest Northwest is a 126-seat event, generally with LAN parties in the spring and fall.



Those caught cheating at LANFest NETWAR are forced to assemble keyboards for the remainder of the weekend.

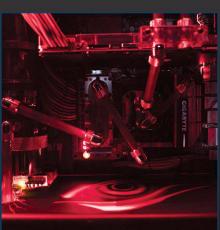
# LANFest Sacramento Fall 2014

As it has for some time now, Intel's Folsom campus hosted LANFest Sacramento, a 403-seat BYOC event including several official tournaments (Battlefield 4, Hearthstone, League of Legends, and Counter-Strike: Global Offensive) as well as a number of LAN-wide contests (Minecraft, Payday 2, TrackMania 2, World of Tanks, and several others). The LAN also hosted workshops on game programming, computer building, and cable sleeving (hosted by Lutro0, natch), as well as a number of non-gaming events and an Intel – *CPU* Magazine Case Mod Contest.









Larry Andersen, a guy who is no stranger to mod contests (his mods have been featured in our "Mad Reader Mod" feature on more than one occasion), took home the top prize this year with his gorgeous GIGABYTE-themed mod. Andersen works at Digital Storm and helped design this case, and as you can see it's well-suited to housing custom cooling loops. Andersen had the case power coated in chrome (it's black in its stock configuration), built a custom power supply cover with GIGABYTE's logo and staring eye graphic, and did extensive cable sleeving and bundling work. You can check out more of Andersen's work at ultimatemods.net.



# LANFest Northwest Fall 2014

This 126-seat BYOC LAN event was held at a new location: Intel's Ronler Acres Campus just off of Hwy. 26 in Hillsboro. Tournaments during the event included Left 4 Dead 2, Minecraft, Call of Duty 4, Team Fortress 2, and Warsow, and there were a number of cool tech demos and other fun activities, as well.









On Saturday, the Intel – *CPU* Case Mod Contest saw Kit Wiley take top honors with his Danger Den green and black acrylic case with a cool Smooth Creations piece on the left panel (the case has an inverted motherboard tray that faces the right side) featuring James Bond/Battlefield artwork.





## HARD HAT AREA

## LANFest NETWAR 27.0

For its fall event, NETWAR once again took place in the Scott Conference Center in central Omaha. There were 304 seats at the event, and it was sold out well in advance of the Friday, Nov. 14 start date. In addition to tournaments for Counter-Strike: Global Offensive, League of Legends, Team Fortress 2, Battlefield 4, and DOTA 2, the event hosted a keyboard assembly competition, a rock-paper-scissors tournament, and of course a huge end-of-the-event prize raffle.



CPU's Case Mod Competition took place on Saturday afternoon. The winner was Dillon Grossman, whose modded white NZXT Phantom 410 looked great, with its custom front end and the occasional red "bloody hands" graphic. Grossman installed a full custom loop (which includes the ASUS CROSSHAIR V FORMULA-Z motherboard), which required him to remove all the front-end drive bays (so the radiator would fit) and cut out much of the front panel. He also altered the top panel for radiator mounting and added a custom side panel window to show off his handiwork.







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# Power User Projec Powder Play

sually, the purpose of "Power User Project" is to introduce you to new enthusiast adventures you can undertake and complete yourself. Many of these projects are easier with help and/or additional advice from your fellow power users, and a lot of them have a reasonably steep learning curve. Still, we expect power users to be able to handle power user projects. It's sort of implied in the title.

This month, we're going to do things a little differently. The topic we'll be discussing this month is one that a lot of advanced modders—you know, the people with years of experience—frequently steer clear of. You see, powder coating is a painting technique that many modders leave to the pros, and by pros we mean businesses that have invested in all the necessary equipment to do the job. The reality is that powder coating cases on a limited basis is simply impractical for the average modder. If you see a PC with a stunning powder coat paint job at a LAN party, there's a decent chance the system builder commissioned the work from a shop that specializes in powder coating.

No one can deny how cool powder looks, though, and if you have a case that could use a little sprucing up, powder coating is an option you won't regret. Although we'll be the first to admit this isn't your typical power user project, we think there's more to having your case powder coated than a Google search for local paint shops. We spoke to a pair of luminaries in the modding community, Jeremy "E.E.L. Ambiense" Birch and Bob "BS MODS" Stewart two dudes who have claimed several Mad Reader Mod features between them-about how to approach powder coating from a user's perspective. We also talked with Forever Powder Coating's (www.foreverpowdercoating.com) owner



Powder coating your case is yet another way to distinguish it from the rest of the crowd, but the process is not for the faint of heart. In addition to buying the powder itself and a specialized gun to apply the powder, you'll also need an oven that can heat the powder in order to bind it to the metal.

Jeff Pinard, a custom powder coating shop based in Olympia, Wash. In addition to his usual clients, Pinard has painted plenty of PCs, so needless to say he has quite a lot of experience on the subject.

No doubt, you've spent hours upon hours of time building, tuning, upgrading, and maintaining your PC. You know what you're doing, and we know that, too, so if you think you have what it takes to powder coat your rig yourself, we'll stand back and let you do your thing. But there's nothing wrong in letting someone else work on your baby, either. If you think powder's in your future, let us be your guide.

#### What The Heck Is Powder Coating, Anyway?

We called powder coating "paint," and to be sure, the average power user will almost certainly refer to it as such, as well.







You might be interested in powder coating for your case, but powder has all sorts of other uses, including bicycle frames, automotive wheels, ATV chassis, and more. Powder coating is unbelievably durable, resists corrosion, and is much more environmentally friendly than paint.

The end result looks like a high-quality paint job. The powder is traditionally sprayed on, like high-quality automotive paint. Yet the truth is that powder coating is, as Birch describes it, "a thermally sensitive plastic polymer."

"Powder coating is an electrostatic form of coating, generally applied to various metal substrates," Pinard says. "The material is a finely ground plastic resin. The part you are coating is grounded, and the powder is electrically charged in a powder coating gun that you apply your coating with." The process of the spray gun applying powder is called electrostatic spray deposition, and the electrical charge Pinard refers to is an electric charge given to the powder molecules. These electrically charged molecules then cling to the grounded part, which is whatever item(s) you're

powder coating. With the powder coating applied, the coated item(s) are deposited in an oven set to 400 degrees Fahrenheit. The exact temperature may vary slightly according to the powder used.

Once the temperature of the material reaches 400 F, the powder melts, forms a uniform coating, and begins to cure. The heat causes a chemical reaction in the powder that "produces long molecular chains, resulting in high crosslink density," according to the Powder Coating Institute. After curing, the items are removed from the oven and allowed to cool. After that, the process is essentially finished.

Although many modders have opted to powder coat their systems, businesses really don't pay the bills by powder coating case panels all day. All sorts of other things are commonly powder coated, including appliances, tools, bicycle parts, and more. You very likely have everyday things in your house/ apartment/secret volcano lair that were powder coated. It's a popular option because of its renowned durability, which incidentally is one of the advantages powder coating has over the more common methods of painting a case. Nicks and scratches are an unfortunate reality of hauling your rig to LAN party after LAN party, and a powder coated case is far more resistant to this kind of battle damage than other types of finish.

#### **Powder Pros & Cons**

As always, Team *CPU* wants you to make an informed decision. Like any PC-related topic worth discussing, you'll find proponents and detractors, the reasonable and the zealous, and

probably a little FUD thrown in for good measure. Is powder truly right for you, or has paint—whether automotive or good old-fashioned rattle can-been your destiny all along? There's a case to be made for either.

A better bond. The composition of powder coating lets it cling to the material it's applied to much better than paint. As a result, powder coating is much less likely to chip off than traditional paint. Also, if you happen to bend or flex a panel during reassembly, powder coating doesn't crack or flake like paint. Just be aware that this isn't spray-on adamantium; a powder coat finish will still scratch if you're determined to damage it. (So don't.)

Insane corrosion resistance. Generally speaking, this benefit is more of an advantage for powder coated items that are frequently exposed to the elements, but the corrosion resistance of powder is a further testament to its durability. Powder coated parts can be subjected to salt spray blasts for hours on end without showing signs of corrosion.

Every color is green. Liquid paint might have a nice finish, but it wreaks havoc on the environment. The solvents in paints are loaded with VOCs (volatile organic compounds) that are frequently ecological hazards and/or dangerous for humans. Powder coating isn't flammable, like most paints. Under the right circumstances, cleanup can be much less messy than spray paint. In fact, under the right conditions, you can recover powder overspray and use it again on subsequent projects.

Fifty shades of powder. Color matching isn't a particular strong suit for powder coating. Let's say that you do want to attempt to powder coat a case yourself. If you underestimate the amount of powder you need for the job, there's no guarantee that buying an extra batch will yield an identical shade. Stewart elaborates, "You can't just buy more to add to it because there are different dye lots, meaning the color won't be exact." Similarly, and more obviously, if you do have plastic parts and were hoping to

"That ABS plastic top panel won't make it through and still resemble the same part when it comes out, unless you were hoping for a molten -Bob Stewart

paint them to match the powder coated metal parts of your case, you'll be in for disappointment, because there's no way to match a shade of spray paint to a shade of powder. That said, subtle differences in color and texture might be acceptable, even desirable, depending on your overall design goals.

Burn notice. As we mentioned, powder coating requires a temperature of 400 F in order to properly cure. Metals can withstand heat like that without breaking a sweat, but plastics don't fare quite as well. "That ABS plastic top panel won't make it through and still resemble the same part when it comes out," Stewart says, "unless you were hoping for a molten pile of goo." If you find that your artistic vision simply won't work without every piece of your case having a matching color and/or finish, then powder might not be the best choice for you. Otherwise, Stewart recommends flexing your creative muscles and coming up with ways to incorporate plastic pieces into your powder coated case's look. Finally, be sure to scour your case for any plastic pieces still connected and remove them before sending your case to the oven.

About that oven . . . Do you remember when we mentioned that lots of modders prefer to hire out their powder jobs because shops have the necessary equipment for the task? Well, powder doesn't work without a lot of heat, and you can't get that heat without an oven. We definitely don't recommend sharing the oven you use to bake your DiGiornos with powder coating components. So if you really want to give powder coating a shot yourself, your first order of business is finding a dedicated oven.

The usual channels for acquiring used stuff (Craigslist, eBay, your cousin Randy who works at the local junkyard) will probably have an acceptable oven, but actually getting an extra oven really isn't the problem. Once you buy that thirdhand Kenmore for 50 bucks, where are you going to put it? Do you have an extra gas line to hook it up, or will you have to pay a contractor to put one in? And for that matter, is a conventional oven with standard dimensions large enough for the parts you need to coat? Powder coated items usually hang on hooks while the powder bakes on, so you need to consider how your parts would hang in a traditional oven.

Take it from Stewart: "I personally have found it's not worth doing myself. I don't want an oven taking up space in my shop, using the extra electricity, or dealing with the extra heat on an already hot day. My advice? Leave it to the pros."

#### Don't-Well, Maybe-Try This At Home

If despite our warnings you're insistent on powder coating your case yourself, we



Powder coating requires temperatures around 400 degrees Fahrenheit to work properly. That makes it suitable for steel and aluminum, but you can forget about trying to apply it plastic.



When working with a professional powder coating shop, be absolutely sure you and the business are on the same page with regard to how many pieces you want powder coated.

won't stop you from trying. In fact, Birch and Stewart even offered a few pointers for the intrepid among you willing to give it a shot.

Aside from the aforementioned oven, you'll need a spray gun designed specifically for powder coat applications. A basic powder coat gun costs about \$100

online. A container of powder typically costs between \$10 and \$20, and most retailers will offer you bulk discounts. Generally speaking, 16 ounces of powder is enough to cover an area of about 20 square feet. Starter kits that include a gun, powder, and accessories are also available.

When you have all the equipment you need, you'll prep your case for paint. "I strip the case of all the fasteners, bumpers, etc. so that I am down to an absolutely bare naked chassis, and then I put the pieces in Ziploc bags," Stewart says. "I mark the bags with how many pieces are in there and what they are for. Then I use a chemical stripper, sanding, or blasting with baking soda to take it down to bare metal."

Birch has specific advice for prepping aluminum: "Aluminum is a very filthy, porous metal, and a lot of oils and dirt can become trapped in the pitted surface. After outgassing (and cooling off), I tend to rub down the material with lacquer thinner (and don't be an idiot—use proper eye protection, gloves, and a breathing mask) followed by tack cloth to get any stuff left behind from the rag." Birch adds that if the aluminum is anodized, he strips that off, as well, and outgasses it in the oven 20 to 30 minutes before applying the powder coat.

After you've scoured the case panels clean of contaminants, hang them up so you can spray them. The approach is effectively the same as what you'd do for painting your case panels with spray or automotive paints. Stewart fashions wire hooks and then has his oven rigged to hang the panels inside. "You can't just lay the parts in there on a cookie sheet," he says. "You won't like the result."

Preheat the oven according to the temperature specified on the powder's container. Once the oven is preheated, you can spray your pieces. Ground the piece you wish to coat to the gun, charge the gun, and begin spraying on the powder. Like paint, you don't want to overcoat the panels, as Birch says the

powder will "pool" if the application is too thick.

Carefully transfer the pieces to the oven and bake them according to the particular powder's specified length of time; when in doubt, always follow the instructions provided by the powder manufacturer. Again, curing time varies slightly between powders, but a general rule of thumb is 10 to 15 minutesplenty of time to make yourself a sandwich. Turn off the oven and let the pieces cool (duh) before removing them.

A coat of powder is thicker than paint, so take this into account. "Powder coating is thick," Stewart says, "so parts may fit a little tighter than they did initially. It may be necessary to tweak things a little upon the first reassembly. Any threaded holes that you plan to use better get plugged or you will be tapping them again."

#### Call In A Pro

Armed with your credit card instead of your usual utility belt of modding tools, you decide it's time to venture forth and find an artisan with the proper tools and skills to powder coat your system the right way. You're still the boss, though, so make sure the shop you hire is a good fit. A custom shop like Pinard's is probably your best bet.

"I would recommend that you always research the shop you would like to do your work and make sure they know how to handle and coat your part properly," Pinard says. "Lots of shops do mostly large industrial-type projects and may not take the time to make sure your parts are prepped and coated correctly. "We are a custom powder coating shop and are equipped to handle projects [such as powder coating a PC]."

Stewart says, "I tried a few shops that were nice enough to do what I needed, but when I explained I was building a custom computer case I could tell they weren't real interested in making sure it was perfect. One day, I found a local guy that does all kinds of cool custom stuff. He does wheels for cars, trucks, and bikes. And he does airbrush work

and pin-striping, too. Once I saw his shop and the stuff he's done, I knew this was the place for me.

"Another important thing for us computer guys is that the custom shops know how to work with the materials correctly. If it's thin sheet metal, they know to be careful so it doesn't get warped or bent."

As a custom powder coating business owner, Pinard has some suggestions to make the whole process better for both parties. He stresses the importance of specifying parts and spots that you don't want coated, such as threaded holes and areas with very tight tolerances. In order to keep the price low, some shops may charge less if you're willing to choose a color that the business uses frequently.

Birch, Stewart, and Pinard all stressed the importance of discussing prep work with the shop ahead of time. It should be a given at this point that you need to remove all the plastic pieces to your case before you hand it over to be powder coated, but the consensus among all three of our experts is that some shops will clean and prepare

your pieces for you, while others won't. It doesn't hurt to prep your case anyway.

"The best thing to do to prep your parts for coating would be to have your parts completely broken down, free of grease or oil, and no plastic or rubber parts that may melt in the oven," Pinard says.

"Make sure you both agree on the parts count when you drop them off," Stewart adds. "Don't just assume they knew exactly what you had. Missing one out of four truck wheels is obvious, but missing one small piece from a case might not get noticed. Another good reason to bag, and label the parts."

#### **Hour Of Powder**

Powder coating definitely has a unique look, and not many enthusiasts outside of hardcore modders have dabbled with it. You have to play with a different set of rules than with spray paint or automotive paint, but the end result is no less stunning with proper execution. Whether you choose to do it yourself or hire a pro, powder coating is sure to crank up your system's wow factor.



When done right, a custom powder coat can be every bit as breathtaking as a glossy automotive paint job. Some, like Stewart, prefer to use a professional custom powder coating business, while others, like Birch, go the DIY route.

# Game Changer How To Buy A Graphics Card

f all the components that go into a PC, the graphics card is one of the easiest to upgrade. That's because traditionally the I/O hub, to which the graphics adapter, storage devices, and external peripherals connect, has been designed to change at a snail's pace compared to the CPU and memory interfaces. For the purposes of maintaining backward compatibility, highly scalable architectures, and a variety of form factors, the PCI Express bus has seen a much slower evolution. While the I/O hub's design philosophy has dictated the evolution of the PCI-E interface, today's enthusiast graphics cards have become significantly more complex and consume much more power than even the most advanced processors.

If you want a perceptible improvement in your PC's ability to run games, the graphics card is really the only component that matters. It's true that there are aspects of games that are CPU- and DRAM-dependent, and some games are more prone to suffer from a memory/CPU bottleneck, but these are the exceptions, not the rule. We're not advocating skimping on the processor, power supply, or other components, which can have an impact on how well the graphics card overclocks and runs, but if you're a gamer, the graphics card will often be the most expensive part of your build, and that's OK.

## But My CPU Already Has That, Right?

Processor-based graphics are present in the mainstream desktop processors from both AMD and Intel, and each generation of processors seems to dedicate more and more of the overall die area to rendering graphics. But this doesn't exactly put them on even footing with



The graphics card will make or break your gaming experience, so it makes sense to get the best you can afford.

discrete graphics cards. In some instances, integrated graphics processing units are so underpowered that graphically intensive games won't even run. More often though, you'll need to reduce the resolution below your monitor's native setting and turn off any and all graphical effects. Even then, the frame rate can be abysmally low.

Processors with built-in graphics engines also need to share access to RAM,

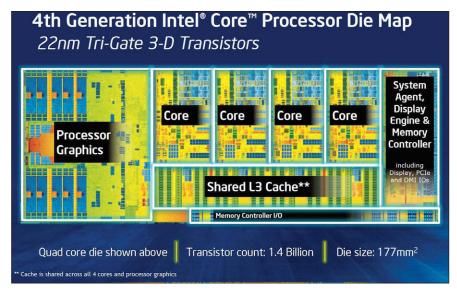
dynamically allocating up to 1GB or more of the system memory for rendering, whereas a discrete graphics card has its own batch of memory from which to load textures, geometry, and colors.

Another way discrete cards have an edge over integrated graphics is in their access to raw power. For the most part, processor-based GPUs are limited by the TDP of the processor. A PCI-E

graphics card will be able to draw up to 75 watts from its PEG slot, and PCI-E power connectors on the cards themselves can draw 75 watts for each 6-pin connector or 150 watts for each 8-pin connector.

Size also matters quite a bit when it comes to the highly parallel workloads that most game rendering consists of. The Intel Core i7-4790, with an Intel HD 4600 on-processor graphics engine, has a total die size of 177mm2, and the graphics-rendering ICs account for less than a third of that total area. By comparison, AMD's Radeon R9 290X and NVIDIA's GeForce GTX 980 dedicated GPUs respectively feature 438mm2 and 398mm2 of silicon that are solely responsible for displaying graphics. Even if all three architectures were identical-which they're not-sheer brute force and better than 10 times as many shaders hands the win to the discreet chips every day of the week.

No one in his right mind would claim that integrated graphics could ever compete with midrange or better standalone graphics cards for gamers playing modern titles, but what about for casual gamers, or HTPC users? For the most part, as long as the 3D workloads are minimal, processor-based graphics are sufficient for these situations. Lowering the resolution and reducing the

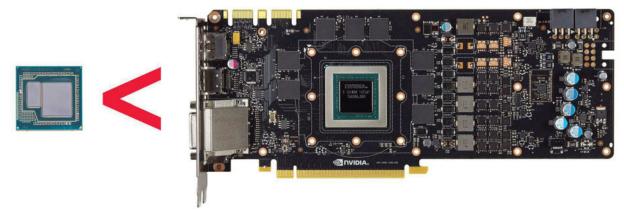


Processor-based graphics that consume a fraction of the CPU's total die area will tend to be a letdown for avid gamers.

visual effects can also enable many PC games to perform adequately on some integrated graphics-reliant systems. But even an inexpensive graphics card lets you increase the resolution, enjoy faster frame rates, and turn on some of the eye candy (shadows, anti-aliasing, and higherquality textures) that makes games so immersive and lifelike.

#### Slots, Ports & Connectors

Most PCs manufactured in the last seven years use PCI-E slots for discrete graphics cards. There are currently three major versions of the PCI-E slot, 1.0, 2.0, and 3.0. PCI-E was made to be backwardcompatible, which means if you buy a graphics card that supports a PCI-E 3.0 slot, it'll still work in a 1.0 slot, just not at the newest revision's higher bandwidth. Between PCI-E 1.0 and PCI-E 2.0, four years passed and the data rate for each PCI-E lane doubled from 250MBps to 500MBps. PCI-E 3.0 supports 8GTps data rates and brings a new encoding scheme to the table, which dramatically reduces the overhead



With its ability to accommodate significantly more transistors to rendering, access to more raw power, and dedicated fast memory, a discrete graphics card is hard to beat.

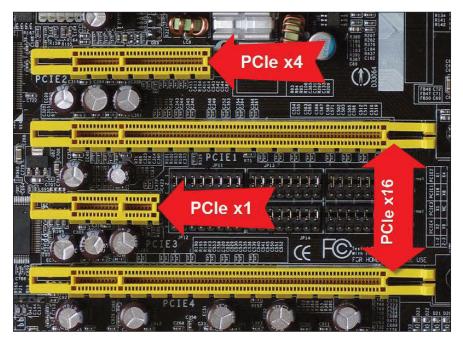
required to shift packets between the PCI-E hub and the individual devices. As a result, PCI-E 3.0 slashed overhead to roughly 1.5% of the total available throughput, compared to PCI-E 2.0's 20%. The PCI-SIG (PCI Special Interest Group) has announced PCI-E 4.0, a revision to the specification that boost transfer speeds to 16GTps. When it comes to data transmissions, a saturated link is a very bad thing, but even as bandwidth-demanding as modern graphics cards are, none currently available saturate a full-speed PCI-E 2.0 x16 slot. If your PC is running a motherboard that uses a PCI-E specification older than version 2.0, you're probably better off doing a complete system rebuild before you look to upgrade your graphics card.

Also note the display outputs. Most current graphics cards have one or more long rectangular DVI (Digital Visual Interface) ports that transmit uncompressed digital video signals to your monitor. Few current graphics cards support the blue 15-pin VGA (Video Graphics Array) port, sometimes called D-sub. These ports transmit analog video signals to your monitor and are most likely to be found on entry-level cards. Modern cards also feature a handful of DisplayPort and HDMI ports, which can look similar but are not interchangeable. If you're looking to upgrade a graphics card, make sure your monitor supports DVI, DP, or HDMI. If not, you'd better add a new monitor to your shopping list.

As we mentioned, discrete graphics cards can demand a lot from your power supply. Midrange and high-end graphics cards typically require supplementary power from the power supply, usually in the form of one or more 6-pin or 8-pin PCI-E power connectors. Make sure your power supply has the appropriate number of available PCI-E power connectors. You may be able to use 4-pin Molex-to-6-pin PCI-E power adapters, but the most important thing to consider is whether the power supply has enough amps on its 12V rail to run the graphics card. Many high-end graphics cards require up to 38A or more, which few budget PSUs generate. Also, if you're upgrading your graphics card significantly, make sure your PSU

has the wattage to handle the increased load. An underpowered PSU may boot with your next graphics card, but unreliable gaming performance may be the fault of an overworked PSU.

Although it may seem obvious, make sure the graphics card you buy will fit in your case. Low-profile cases require low-profile cards and brackets. Many graphics cards are also double-slot, meaning they take up



Typically the topmost PCI-E x16 slot on your motherboard is considered the PEG, or PCI Express Graphics, slot.



Double-check that your PSU can handle the increased draw of a new, more power-hungry graphics card.



CAD, design, rendering, and drafting professionals are also a target audience for powerful discrete graphics cards.

two expansion slots on the motherboard. Most high-end graphics cards are at least 10 inches long, and many older mid-tower and smaller cases won't accommodate such a long graphics card.

#### Who Needs To Go Discrete?

Up to this point, we've laid out an argument for why gamers are the prime audience for graphics cards, but they're not the only ones. Visual artists and professionals who use CAD (computeraided design) applications also value a discrete graphics card's rendering horsepower. But beyond that, the GPGPU (general-purpose computing on graphics processing units) field has broadened the scope of what a powerful GPU can do. Programming languages such as OpenCL and CUDA apply the parallel processing power of GPUs to computing tasks that were once exclusively the domain of CPUs in a variety of industries. Some consumerbased applications use GPGPU techniques to enhance and speed up video and imaging editing operations, content creation, decoding and encoding tasks, and more.

Unlike CPUs, which play a role in most things you do with your PC, graphics adapters are better suited to accelerating games, 3D modelling software, imageediting apps, and high-definition video. If you do any of these activities, even just occasionally, you could see a performance boost with a discrete graphics card. And by handing off these tasks to a graphics card, the CPU is able to dedicate more of its resources to other tasks, which can improve

response time and multitasking. Even operating systems are beginning to demand a lot from these chips. In short, most avid PC users will enjoy the benefits of a discrete graphics card.

#### **How Much Graphics Card** Is Enough?

The easy answer to the question of how much you should spend on a new graphics card is "as much as you can afford," but you likely have a long list of games demanding a portion of your overall budget. So the question often becomes, how much graphics card is truly enough? Let's discuss just how much performance you can expect per dollar. Prices were current as we went to press.

Today, if you plan to spend anything less than \$100 on a new graphics card, you won't



Liquid-cooling your graphics card can reduce the GPU and system temperatures and improve the card's overclocking potential.

see a huge improvement in your frame rates compared to the best integrated processor graphics from Intel and AMD. At between \$50 and \$100, you can get discrete graphics cards that will deliver acceptable light gaming performance. Resolutions at this price range are also limited to 1,920 x 1,080 at the upper end for 3D content, so multiple monitors or that 4K display you've been pining for will need a little more oomph. A \$100 graphics card is unlikely to be able to take advantage of the 3D gaming capabilities that most modern GPUs support, such as advanced tessellation and antialiasing techniques. Examples of graphics cards available in this price range include the AMD Radeon R7 250, AMD Radeon HD 7790, NVIDIA GeForce GT 740, and NVIDIA GeForce GTX 650 Ti.

There is a stark visual difference between a modern game running on an entry-level graphics card and one that's going to cost you about \$200. If you plan to spend right around this amount of money, you can get a powerful graphics card that's built to handle pretty much any modern game with the settings turned to medium or high. For many graphics card vendors,

this is the sweet spot, and there are always great bargains to be found if you keep an eye out for sales. For the most part, don't buy a graphics card in this range with less than 2GB of memory; set your sights on a card with 3GB or more of fast (GDDR5) onboard memory and a memory bus 192bit or higher if multi-monitor gaming is something you'd like to try. Keep in mind, the larger the frame buffer, the better your graphics card will be at keeping up with high resolution textures. SLI and CrossFire connectors are abundantly available on graphics cards in this price range, so upgrading your system with a second identical card is a way to extend the life of your midrange graphics card. Adding a third midrange card in SLI or CrossFire won't net you enough extra frames to be worth the expense, however. Many cards here are also good for overclocking, so look for graphics cards aimed at overclockers to potentially get more performance per buck. As we went to press, we found an AMD Radeon R9 280 with 3GB of memory, an AMD R9 270X with 4GB of memory, an NVIDIA GeForce GTX 670 with 2GB of GDDR5, and an NVIDIA

GeForce GTX 750 with up to 2GB of GDDR5 memory.

For between \$250 and \$350, you're getting into the class of graphics cards capable of pushing pixels as fast as your eyes can see them. Generally speaking, you'll be able to max out the settings on all but a very small minority of games, and running one, two, or three monitors should be no sweat. You'll often find some of the highest-end GPUs from the previous generation available in this price range. These graphics cards are also where gamers can enable (and enjoy) all of the features that require a high level of performance from the GPU in order to work and/or not drastically reduce frame rates, such as exclusive antialiasing techniques, 3D gaming, high refresh rates, and game streaming, which lets you play games remotely over a low latency network connection. 4K rendering is also possible, but many graphics cards in this price range may not deliver high frame rates at such a high resolution. Examples of graphics cards in this range include the NVIDIA GeForce GTX 970 and the AMD Radeon R9 290X with 4GB GDDR5.

At \$400 and above, you're typically looking at the flagship graphics card from AMD or NVIDIA. These cards are designed to run today's games at their best and stay fairly capable for a couple years at least. AIB partners also commonly produce versions equipped with coolers that can dissipate significantly more thermal energy than what the card produces at stock settings, often enabling considerable factory overclocks. Cards we found in this range as we went to press include the NVIDIA GeForce GTX 980, NVIDIA GeForce GTX 780 Ti, and the AMD R9 295X.

#### **Settler Beware**

Videogames, arguably more than any other type of PC software, continually drive the need for faster hardware. If you're sitting on a graphics card that's a couple years old, you will notice that current games are running slower and fewer effects can be enabled while maintaining playable frame rates. If you've made it this far, then you already know what you need to do. Upgrade and be merry. ■

# A Miniature Gaming Bea ASUS' ROG G20 Is Armed For Victory

t Computex 2014, the ASUS ROG G20 won plenty of accolades, including the prestigious Best Choice of the Year award, which represents the top prize for design and innovation. This small form factor system won for its cutting-edge design and distinctive performance. For example, the ASUS ROG G20 is available with an Intel Core i7-4790, an NVIDIA GeForce GTX 760 graphics card, and 16GB of DDR3. The sophisticated chassis is another big draw, with multiple lighting zones that can shine in your choice of 8 million custom colors. With such an intriguing combination of hardware and design, the ROG G20 certainly warrants a closer look.

#### The Design Story

ASUS' ROG gaming desktop team began development of this desktop PC family by evaluating gamers' needs. At the top of the list was a compact design that delivered maximum performance. This way, it would be easy to tote the PC to a LAN party. Of course, powerful gaming hardware frequently generates a lot of heat, which poses a significant challenge for any SFF gaming rig, due to limited internal space for ventilation. The ROG team devised the chassis with dimensions (13.4 x 4.1 x 14.1 inches [HxWxD]) large enough to accommodate the cooling necessary for today's high-end components and sufficient cooling, while keeping the physical footprint to a minimum.

Cooling the ROG G20 isn't your typical affair, though, because the ROG team wanted the case to have a neat, clean exterior with no visible side exhaust vents. Always innovating, ASUS uses a hidden airflow tunnel that takes advantage of natural heat convection to exhaust hot air out the top vents. Two installed fans help



The ROG G20 is a small form factor PC that packs a powerful punch.

quickly dissipate heat from the system's internals. You can be certain that the ROG G20 will perform well during long gaming sessions, because ASUS ran the system through its rigorous testing and

validation process. For example, the PC is certified to run in environments as hot as 60 degrees Celsius.

As you can see, ASUS also made system style a priority. The ROG G20's



ASUS optimizes the airflow within the ROG G20 using a hidden airflow tunnel and two fans to dissipate heat.

aesthetic follows the traditional ROG polygonal chassis—with its strong angular lines—while also incorporating sharp lighting effects that shine through Mayaninspired markings that run along the front and top panels. There are three lighting zones, and you can select a different color for each zone. Besides color, you can also configure the brightness level, so you can make the lighting effects as subtle or as vivid as you'd like. The end result of ROG team's effort is a desktop PC that's both artistically and technically impressive.

#### The Hardware

A great look and portable form factor are admirable, but a gaming system requires formidable hardware under the hood. ASUS opted to use Intel's H97 chipset to take advantage of Haswell processors. At the top end, the ROG G20 utilizes Intel's Core i7-4790 to power through demanding tasks. As a refresher, Intel's Core i7-4790 hits 4GHz when running at its maximum Turbo frequency, and it delivers four cores with Hyper-Threading. ASUS also offers ROG G20 models with Intel Core i5 or Core i3 processors, should you be looking for a ROG G20 that's a little more budgetfriendly. The ROG G20AJ-US023S, for example, comes with an Intel Core i5-4460, while the ROG G20AJ-US006S features the Intel Core i3-4150.

To let you play your favorite games (and make them look good), the ROG G20 supports up to an NVIDIA GeForce GTX 760 graphics card. The GeForce GTX 760 can run most of today's popular games above 30fps at 1080p, even with many or all settings maxed. ASUS typically pairs the

NVIDIA GeForce GTX 760 and Intel's Core i7-4790 on high-end ROG G20 models. ROG G20 systems with an Intel Core i5 or Core i3 processor often feature the GeForce GTX 750 or GTX 745 graphics cards, so your gaming experience will still be powered by a dedicated GPU.

Multitasking should be no problem on the ROG G20, as the system supports up to 16GB of memory. Most ROG G20 models have at least 8GB of memory. Storage options depend highly on configuration, but the ROG G20 supports up to 1TB of capacity. We found that most models also feature hybrid drives that cache the most frequently used data on high-speed NAND for SSD-like performance. For example, some G20AJ-US0009S configurations feature a 1TB hybrid drive with 8GB of solid state memory.

There's even an optical drive in this small case, and ASUS makes the ROG G20 available with DVD burner, Blu-ray combo drive, or Blu-ray burner. The optical drive is cleverly concealed in the center of front panel. The ROG G20's



The ROG G20 can handle full-sized graphics cards, including NVIDIA's GeForce GTX 760.



ASUS bundles a mouse and keyboard with the ROG G20.



The Aegis software utility lets you manage real-time performance with ease.

storage capacity and the inclusion of an optical drive let the system double as a multimedia center, when you want to take a break from PC gaming and watch a movie.

#### Sounds Good To Me

Quality audio is critical to an immersive gaming experience, so ASUS didn't skimp on the system's sound processing. The ROG G20 comes with

ASUS' SonicMaster technology that's designed to make in-game sounds, such as gunshots and footsteps, become directional cues that can help you to better find enemies. The ROG G20 also features the ROG AudioWizard utility to provide you with audio profiles, such as Battlefield and Multimedia, to instantly configure the system according to a given soundscape. For example, Action mode increases bass to make every rumbling sound effect more realistic. It's easy to switch audio modes on the fly, too. Audiophiles that require further customization can use the EQ audio bar in the ROG AudioWizard.

#### **Get Your IP Priorities Straight**

ASUS gives you the power to shape network traffic with GameFirst II technology, so you can make certain the gaming experience comes before any background PC tasks. You don't even need to be a networking wiz, as the there's an EZ Mode where you can set the priority for VoIP, media streaming, gaming, and file sharing. For network management experts, there's also an Advanced Mode where you can do things such as reduce ping times at the expense of bandwidth, run online speed tests, and monitor network activity.

According to ASUS, the ROG G20 boasts latencies up to eight times lower than standard Ethernet. On the ROG G20's wired connection, ASUS uses Intel's latest Gigabit Ethernet controller that minimizes demand on the processor. Some ROG G20 models also come with built-in wireless connectivity that supports 802.11ac and Bluetooth 4.0.

#### **System Monitoring**

When designing the ROG G20, ASUS wanted to ensure gamers had a way to monitor system performance, which lead to the creation of the Aegis utlity. This command center gives you a realtime view of critical system parameters and settings, such as CPU and memory usage. You can even set temperature and voltage thresholds for the ROG G20's key hardware. The Aegis software has a

user-friendly interface that lets you quickly switch between various settings and real-time performance gauges.

#### **Energy Savings**

When we talk about gaming systems, energy efficiency isn't often a primary concern. But that doesn't mean we aren't interested in reducing the electric bill if given the chance. ASUS has designed the ROG G20 with an Eco Energy mode that draws as little as 20W when the PC is idle—energy savings of 50% compared to the industrial average, according to ASUS. The Eco Energy mode is ideal when performing tasks that don't require the performance of a dedicated GPU, such as downloading updates or running an antivirus scan. To use Eco Energy mode, you'll connect the ROG G20 to the onboard HDMI output rather than the video outputs on the system's discrete graphics card.

#### **Powerful Bricks**

Most ROG G20 models come with two power adapters that plug into a pair of power jacks (180W and 230W) on the rear chassis. The second adapter is provided to power models with a high-end graphics card, such as the NVIDIA GeForce GTX 760. ASUS includes a ROG-branded bracket to hold the two adapters together.

There are a couple of advantages of the dual-brick design. First, it lets ASUS accommodate the power demands of modern graphics cards. ASUS also found that it was more power-efficient to have a second adapter, rather than a single, higher-wattage adapter. Splitting the adapters also enables the ROG G20 to use its low-power Eco Energy mode. Lastly, as opposed to an ATX PSU, the two adapters make almost no noise.

#### Whisper-Quiet

Speaking of noise, or the lack thereof, the ROG G20 is designed to be nearly silent. At idle, ASUS estimates that the system will operate at a mere 22dB—quieter than a library. Under full load, the ROG G20's noise level moves up



The ROG G20 also comes with a slim optical drive with options that vary by configuration. High-end models often feature a Blu-ray burner.

to 45dB, which is still quieter than an average conversation.

#### Always A Port Available

SFF rigs aren't generally known for having a bevy of connectivity options. ASUS makes sure that gamers won't find themselves running short on places to dock their armada of peripherals. The ROG G20 comes with four USB 3.0 ports (two front, two rear) and four rear USB 2.0 ports. The front panel also offers headphone and microphone jacks for convenient access, while a full set of 7.1-channel audio outputs are available on the rear panel.

#### Inputs Included

ASUS bundles a mouse and keyboard with the ROG G20, and the devices match the style of the system exterior. Now, you won't find any Mayan-inspired details here, but the keyboard offers a similar matte black finish with blue

LED-backlit keys. There's also a built-in volume knob built on the keyboard, so you won't need to exit your game to quickly adjust the overall system volume. The mouse is also black, but it offers a shiny, black finish that reflects the illumination from the ROG G20's system lighting.

#### **Grace & Power**

The ultimate portable gaming desktop must also look the part, and the ROG G20 is both imposing and statuesque. It's impressive that ASUS is able to pack an Intel Haswell processor and full-sized NVIDIA GeForce graphics card into this portable rig. If you're looking for a readymade SFF gaming system, check out the various ROG G20 models available online. We found that the ROG G20 starts at \$699, while high-end models top out at \$1,299. Plus, its small size means it'll probably fit under the tree, too, if you're looking for something to add to your wish list.

## YTF GA-X90-1 A Lasting Performance

ongevity is important for any PC, but it's especially crucial for a "dream PC" that you expect to deliver topnotch performance for years. One of the best ways to improve the durability of your system is to select a motherboard with high-grade power parts. With precise, efficient power handling, the motherboard can easily handle the extreme loads and heat generated by today's highest-end processors and graphics cards.

The GIGABYTE's GA-X99-UD5 WIFI is a seriously stable and durable motherboard. It's got an all-digital CPU power design, server-grade Cooper Bussmann chokes, high-quality solid-state capacitors, extra gold plating on the component sockets, additional copper in the PCB, and wide copper ground pads around the PCB mounting holes. Of course, the GA-X99-UD5 WIFI is also built to work with today's latest and greatest hardware. Let's see what it has to offer.

#### Overclockers Welcome

There's no doubt that Intel's new Haswell-E chips are powerhouses, and on the GA-X99-UD5 WIFI, GIGABYTE gives that speedy multitasker an Intelcertified home. "To ensure the best performance for Intel's Haswell-E Processors, the board's CPU socket is an Intel-Certified CPU socket," says Leon Chen, PR manager at GIGABYTE. "What better way is there to ensure that our board will work with Intel's Haswell-E Processors?"

We briefly mentioned that this motherboard delivers all-digital power to the CPU, and it's worth going into more detail. GIGABYTE takes advantage of the newest IR (International Rectifier) digital power controllers, as well as the latest PowIRstage ICs to distribute precise



power to your Haswell-E processor. Chen says, "The use of all-digital CPU power, as well as IR's single-package design, produces less heat overall, which translates to a more stable and cooler overclock." IR's Isense technology is one of the "coolest" things about the GA-X99-UD5 WIFI, because Isense helps to prevent overheating of the motherboard's PowIRstage ICs by evenly distributing the thermal load across each individual IC.

With such overclocking potential, GIGABYTE makes certain you have the onboard tools to quickly optimize speed. "The GA-X99-UD5 WIFI has some features overclockers will love, such as a direct-to-BIOS button, a debug LED, onboard power and reset buttons, and an OC-PEG connector," says Chen. The dedicated buttons for common OC tasks can greatly simplify the overclocking process. For example, you can quickly clear the CMOS or reference the debug display if something goes wrong. And the

dual-BIOS switch allows you to compare different BIOS configurations for best performance or bug solving.

Those looking to overclock graphics cards will like that GIGABYTE includes a SATA power connector for dedicated power to the PEG slots. This way, you can provide extra juice to your GPU (or GPUs) for a more stable overclock. Besides the CPU and graphics cards, you'll also be able to overclock your DDR4 memory, as the GA-X99-UD5 WIFI supports speeds up to DDR4-3000.

GIGABYTE has covered all the bases where component connections are concerned, as well. "We've increased the amount of gold used in the DDR4 Slots, PCI-E Slots, and CPU sockets," says Chen. "We've begun to use 30-Micronthick plating, six times the industry standard (usually only five Microns), to help improve connectivity as well as reliability and longevity by preventing tarnish and corrosion." GIGABYTE even



GIGABYTE gave the board an Intel-certified CPU socket to ensure optimal performance with Haswell-E.

increases the durability of the mounting holes on the motherboard, as you'll find bigger copper ground pads there than with conventional designs to reduce EMI disturbances and avoid damage to nearby components during the assembly process.

#### **Not Your Typical X99 Motherboard**

All motherboard manufacturers make tweaks to the stock chipset, but GIGABYTE really dazzles with the GA-X99-UD5 WIFI. "For extreme gamers, we have support for four-way graphics



GIGABTYE includes two M.2 ports, one for PCI-E storage and one with a Wi-Fi (802.11a/b/g/n/ac) and Bluetooth 4.0 combo module.

configurations, and we also utilize nextgeneration storage options," says Chen. The stock X99 chipset offers you four PCI-E lanes at x8 speeds, which provides a total bandwidth of 256Gbps. The GA-X99-UD5 WIFI boosts the total PEG bandwidth by installing an onboard clock generator and making a direct connection to the Haswell-E processor for one of the PCI-E lanes. Chen explains, "The GIGABYTE GA-X99-UD5 WIFI is capable of a 320Gbps Bandwidth when four or three cards are installed." Both four-way SLI and CrossFire are supported.

When it comes to next-generation storage, GIGABYTE includes a SATA Express connector and M.2 connector—both of which support up to 10Gbps transfers. (Note that the SATA Express and M.2 ports share bandwidth, so you'll only be able to use one or the other.) To connect with conventional SATA storage, there are 10 6Gbps SATA ports. Six of the ports support RAID 0, 1, 5, and 10 configurations.

The networking capabilities of the GA-X99-UD5 WIFI are impressive, as well. GIGABYTE installs a dualband wireless communication module that supports 802.11a/b/g/n/ac and Bluetooth 4.0. The combo module

should cover your wireless connectivity needs into the near future. If wired connectivity is more your thing, you'll like that GIGABYTE provides two Intel Gigabit Ethernet controllers that support advanced teaming for 2Gbps bandwidth. Chen says "The speedy networking is a necessity for gamers who are always looking for the best and fastest connection for FPS games, where speed is important."

Of course, GIGABYTE also gives you a tool to manage traffic over the Intel NICs. Chen says that the included cFos Speed accelerator software helps to manage network traffic, so you can maintain lower ping times and have better responsiveness by optimizing and prioritizing packet delivery. The software gives you control of that prioritization, so you can select the applications (key games, VoIP, streaming media services, etc.) to accelerate above background network traffic.

Enthusiasts have come to expect great onboard sound on today's high-end motherboards, and the GA-X99-UD5 WIFI doesn't disappoint. "We've done a lot for audio enhancements, and you can actually see that with our audio guard light path," says Chen. "This path separates the digital side from the analog side and reduces noise that may incur from the digital side of the motherboard." The audio components themselves are impressive, too. "We use high-quality Muse ES capacitors, and we also have a direct path from the audio chip straight out to the 3.5mm jacks," says Chen. The whole package is rounded out with a Realtek ALC1150 audio codec that supports 7.1 surround sound.

#### A Motherboard That Makes You Look Twice

A "wow" factor is part of any dream system, and the GA-X99-UD5 WIFI features customizable onboard lighting, so it's a great showpiece for a case with a clear side panel. "With our X99 chipset motherboards, we introduced a feature called Ambient LED," says Chen. "It allows users to show off their computer with LEDs on the motherboard.



The GA-X99-UD5 WIFI offers two Intel Gigabit network controllers that support advanced teaming for 2Gbps bandwidth.

GIGABYTE is the first motherboard manufacturer to incorporate LED lighting on the chipset heatsinks and back I/O."

GIGABYTE lets you control the LED display modes within its App Center utility. "It has various modes for users to choose from, including Pulse mode, where the lights glow on and off at a steady rate, Beat mode, where the lights will flash to the beat of the music that your computer is playing, and Still mode, where the lights are always on," say Chen. Of course, you'll also have the option to turn the Ambient LEDs off (on either just I/O shield or all the LEDs). A sharp-looking gold and black color scheme on the motherboard's heatsinks also help to provide a showy home for your system's components.

#### A Sweet Suite

Motherboard features can go to waste without an easy way to manage them, so GIGABYTE includes its App Center software suite. This Windows utility is provides a central interface where you can launch all of the individual GIGABYTE apps included with the GA-X99-UD5 WIFI. You'll find a variety of utilities for fine-tuning your rig's hardware, such as EasyTune (for CPU and memory overclocking), V-Tuner (for GPU overclocking), and System Information Viewer (allows you to monitor and adjust fan speeds). Storage tasks can be handled through the EZ Setup app, where you can configure Intel Smart Response technology or set up a RAID configuration.

You'll also find utilities that let you use a

smartphone or tablet to remotely control the PC, which is possible thanks to the motherboard's built-in wireless connectivity. "Not only is the hardware cutting-edge, but so is the software we've incorporated," says Chen. "We have features that help make your system work for you, such as HomeCloud or Hot Spot, which makes your computer into a cloud server or a virtual access point."

You can even share resources among your desktop PC and mobile devices. To access these features from your mobile devices, you'll need to download the GIGABYTE Cloud Station app on your Android or iOS device.

Remote OC is one of the more interesting utilities for enthusiasts, as you can change CPU and memory frequencies and voltage settings directly from your smartphone or tablet. Remote OC also offers a Quick Boost function where you can switch among three preset OC configurations. You can use Remote OC to remotely shut down or reboot your PC, too.

#### **Ultra Durable Meets Ultra Performance**

The X99 chipset is all about going extreme, and the GA-X99-UD5 WIFI gives you a foundation that's designed to handle the toughest workload you can dish out. It's ready to help you fully unlock the potential of Intel's Haswell-E processors, as well as your awesome new DDR4 memory. Many of the features of GA-X99-UD5 WIFI can also be found on the X99-GAMING and X99-SOC FORCE models, if you feel that you need a motherboard a bit more suited to gaming or extreme overclocks. "GIGABYTE carries a lot of models that will satisfy your needs, so definitely check out our lineup and if there is something you feel you want to see in future products reach out to us or leave some feedback and maybe you'll see it in your next build," Chen says. Now that's what we call service.

Chipset	Intel X99
Max Memory	64GB DDR4 (DDR4-2133; Max OC: DDR4-3000
Expansion Slots	4 PCI-E x16, 3 PCI-E x1
Storage	10 6Gbps SATA, 1 SATA Express, 1 M.2
Rear USB Ports	8 USB 3.0, 2 USB 2.0
Internal USB Ports	4 USB 3.0, 4 USB 2.0
LAN	2 Intel Gigabit Ethernet LAN (with teaming)
Wireless	802.11a/b/g/n/ac and Bluetooth 4.0
Rear Audio	1 optical S/PDIF, audio I/O
Form Factor	E-ATX
Warranty	3 years

## 7RIKE-X





- CUBE
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Shell-like vent structure design



Removable M/B plate design







12CM/14CM

Color:Blue/Black/White/Red

M468707 | Patent Pending - USA/Germany/China



World's First Dual Material Fan Blade Design | Minimizing Turbulence and Noise | Anti-Vibration

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## ADATA XPG Z1 DDR4-2400 16GB

\$289.99 • www.adata.com



Performance enthusiasts are a picky lot, so you can't just get us any DDR4 kit. ADATA's XPG Z1 memory is designed with a heat spreader that delivers superb cooling and stable data transfers, so the modules are ideal for those looking to push performance. This 16GB XPG Z1 DDR4-2400 kit (model number AX4U2400W4G16-QRZ) comes with four modules to let you take full advantage of the quad-channel controller built into a Haswell-E processor. Of course, ADATA has enhanced the modules' performance with Intel XMP 2.0 timings of 16-16-16-39.

The XPG Z1's Thermal Conductive Technology should pique the interest of overclockers and performance enthusiasts. It boasts a 10-layer PCB with two ounces of copper (double what you'll see on traditional DRAM PCBs). The extra PCB layers and copper enhance the quality of the modules' signal transfer, which also improves the memory's power efficiency. If this 2400MHz kit isn't enough capacity for the power user in your life, ADATA also offers a 32GB XPG X1 DDR4-2400 kit. XPG Z1 DDR4 kits are also available at DDR4-2800MHz.

THE PERFECT GIFT FOR: POWER USERS THAT WANT A DDR4 KIT THAT CAN RELIABLY HANDLE OVERCLOCKS.

#### THE PERFECT GIFT

## EVGA TORQ X10 (901-X1-1103-KR)

\$69.99 • www.evga.com/mice/torq



Introducing the EVGA TORQ X10 gaming mouse. Built with the highest-quality materials, this mouse was designed from the ground up to satisfy the needs of the hardcore gamer with a high-quality laser sensor that provides up to 8,200dpi, an adjustable weight system, and nine programmable buttons. And thanks to the TORQ X10's ambidextrous design and unique sizing system (which allows you to adjust the height of the body), this mouse adjusts to you, not the other way around.

We didn't stop there, though. The EVGA TORQ X10 features the highestquality Omron switches with a lifespan of over 20 million clicks. We also included a full-metal base and solid construction throughout, the latest Avago 9800 laser sensor (up to 8,200dpi with a 1,000Hz polling rate), a 6-foot silver-coated USB cable, seven-color adjustable LED backlighting (red, green blue, yellow, orange, pink, and purple), and much more.

THE PERFECT GIFT FOR: HARDCORE PC GAMERS LOOKING FOR A COMPETITIVE EDGE AND/OR A MOUSE THAT MATCHES THEIR LATEST BUILD.

## FirePower ModXStream Pro 700W

\$69.99 • www.firepower-technology.com



Although fans are a necessary evil to cool our system components, most enthusiasts prefer a PC that makes as little whirring noise as possible. The FirePower ModXStream Pro 700W is a power supply that features a load-controlled fan, so it'll make almost no sound when the system is idle. You can rest assured that system internals are receiving stable power, too; this PSU features overvoltage, overpower, and short-circuit protection, as well as active power factor correction. FirePower backs the ModXStream Pro with its three-year "power swap" warranty, ideal for peace of mind.

Enthusiasts who prioritize cable management will like that FirePower uses a semi-modular cabling design. To support performance builds, the ModXStream Pro 700W includes both a 4-pin and 8-pin CPU power connector, as well as 6-pin and 6+2-pin PCI-E connectors, so you can power a high-end GPU. Power efficiency is part of the package, too, as the ModXStream Pro 700W has 80 PLUS Standard certification.

THE PERFECT GIFT FOR: **SYSTEM BUILDERS THAT VALUE QUIET OPERATION, POWER EFFICIENCY, AND MODULAR DESIGN.** 

#### THE PERFECT GIFT

## EK Water Blocks EK-Supremacy EVO Gold

\$112.40 • www.ekwb.com



Also available in Acetal, Copper, Nickel, White, Red, Blue, and Green finishes (prices vary).

Normally, the last thing we look forward to this time of year is low temperatures. But we'll take EKWB's EK-Supremacy EVO Gold in our stocking precisely because of low temperatures. The most powerful thoroughbred in EKWB's stable of waterblocks, the EK-Supremacy EVO is the product of years and years (and years) of R&D in the company's top-secret lab. The waterblock, which is compatible with all current desktop processor sockets, has a pure copper base with gold plating that's polished to a mirror finish—an incredibly effective method of transferring heat away from the processor.

There's more magic inside the block itself. The EK-Supremacy EVO has a high-flow design; the waterblock is able to perform well even in loops that don't have a tremendously strong pump. The EK-Supremacy EVO's jet plate helps coolant surge through the block, and EKWB machined a series of microchannels to increase surface area. The gold finish gives this waterblock a classy look that's as refined as the EK-Supremacy EVO itself.

THE PERFECT GIFT FOR: **POWER USERS WITH A CUSTOM LIQUID- COOLING LOOP WHO COULD USE A WATERBLOCK UPGRADE.** 

## **Topre Type Heaven**

\$150 to \$180 • www.topre.co.jp



The Type Heaven capacitive hybrid keyboard was built for typists and those in data entry and banking. We'd argue that enthusiasts are a more apt audience because we spend a significant amount of our leisure time at our PCs, and the Type Heaven reminds us just how much fun it can be to push buttons.

The Type Heaven accomplishes this using a cone-shaped central spring with 4mm of travel and a capacitive sensor that gives the keys a smooth consistent motion with a distinctly mechanical feel. Typing on the Type Heaven is whisper quiet, and it takes just 45g (plus or minus 15g) of force and to register strokes. We like mechanical keyboards, but the Type Heaven's unique tactile response is supremely satisfying; we called it one of the most comfortable keyboards we've ever used. It's not flashy, charcoal grey lasered keys sit in a matte black frame and the only LEDs you'll find are there to indicate the state of the Caps, Num, and Scroll Lock keys. Other features we like include keys with a 50 million stroke lifetime, 6-key rollover, and heavy industrial construction.

THE PERFECT GIFT FOR: ANYONE WHO WANTS TO ENJOY THE SIGNIFICANT AMOUNT OF TIME THEY ALREADY SPEND USING A KEYBOARD.

#### THE PERFECT GIFT

## GIGABYTE BRIX Pro BXi5-4570R

\$499.99 • www.gigabyte.us



Ultra-compact PCs have really hit their stride recently, and GIGABYTE's BRIX Pro models are some of the most powerful barebones minis available. For example, the BXi5-4570R comes with a quad-core processor that features a max turbo of 3.2GHz (Intel's Core i5-4570R). That's a lot of power considering the computer's absolutely tiny dimensions (2.4 x 4.3 x 4.5-inches, HxWxD). Home theater enthusiasts looking for a living-room PC will like that the BXi5-4570R uses Intel's Iris Pro 5200 graphics that support 4K resolution via HDMI.

With this barebones kit, power users get to select their own storage and memory. The BXi5-4570R supports both mSATA and 2.5-inch storage devices. There are two SO-DIMM slots where you can install up to 16GB of DDR3L memory. GIGABYTE bundles a VESA bracket with the BXi5-4570R, so you can mount the system behind a monitor or HDTV and discreetly hide it from view. GIGABYTE also includes wireless connectivity with support for both 802.11a/b/g/n/ac Wi-Fi and Bluetooth 4.0. In short, the BXi5-4570R boasts most all the amenities of a full desktop, but in a more compact package.

THE PERFECT GIFT FOR: ENTHUSIASTS THAT WOULD LIKE A COMPACT PC FOR USE IN THE LIVING ROOM, OFFICE, OR WHEREVER, REALLY.

#### THE PERFECT GIFT

## AntLion Audio ModMic

\$49.95 • www.modmic.com



Enthusiasts are a fussy bunch. We love many of the peripherals we own, but there are few that we would consider perfect in every way. Headsets, for example, are high on the list of components many of us wish

sounded better, were more comfortable, or suited our play styles more. The AntLion Audio ModMic is a unique peripheral that lets us transform any beloved pair of headphones into a high-quality headset. The device consists of a flexible boom with a magnetic clasp on one end and a 9.7mm electret capsule condenser microphone on the other end. Just stick it on the right or left side headset can, and plug the cable into your PC's mic input to get the most from your social gaming sessions.

The ModMic's magnet rotates on the base for those times when you want it out of the way temporarily, and the sturdy steel spine flexes enough to let you position it just right when you do want to communicate. The unidirectional mic has a sensitivity of -38dB and a frequency response from 100Hz to 10kHz. AntLion Audio says it perfectly: "Keep your headphones. Add a mic."

THE PERFECT GIFT FOR: THOSE WHO WANT TO TURN THE HEADPHONES THEY LOVE INTO THE HEADSET THEY LOVE.

#### THE PERFECT GIFT

## Bgears b-PWM 120mm/140mm

\$15.99/\$17.99 for blue or red LED (\$14.99/\$16.99 for black) • bgears.com



Stock case fans typically provide enough airflow for budget and mid-range components, but the high-end hardware in a power user build can often benefit from a little extra ventilation. Fans with LEDs, such as models in the Bgears b-PWM 120mm and b-PWM 140mm lineup, can also help to improve the look of your PC. Bgears offers these 2 ball bearing fans with blue or red LEDs (with matching frame and blades). If red and blue don't fit your existing color scheme, there's a no-LED option with a translucent black frame.

PWM (pulse-width modulation) fans provide the best of both worlds when it comes to noise and cooling performance. All of the fans in the b-PWM family spin as slowly as 500rpm for nearly silent operation when the PC is idle. When the PC is under load, the fans ramp up to full speed (2,000rpm for the b-PWM 120mm and 1,800rpm on the b-PWM 140mm) to quickly move and exhaust hot air. At the maximum fan speed, Bgears rates the fans at an outstanding airflow of 110cfm.

THE PERFECT GIFT FOR: **ENTHUSIASTS WHOSE IDEA OF "DECKING THE HALLS" IS CUSTOM LIGHTING AND IMPROVED PC COOLING.** 

## **ASUS ROG Gladius**

\$79.99 • www.asus.com



It's a great time to be someone who enjoys a great first-person shooter. But whether you're currently engrossed in the latest Borderlands or Call of Duty game or are eagerly anticipating the PC launches of Evolve or Grand Theft Auto V, having a capable gaming mouse is essential.

This season, you'll find few mice that do point-click-kill quite as elegantly as ASUS' ROG GLADIUS. The mouse has a sports car engine—a 6,400dpi optical sensor and the world's first 2,000Hz polling rate-and is a tweaker's delight. Specifically, the GLADIUS has a switch socket design that actually lets you swap its Omron switches for different levels of click resistance. Speaking of swapping, the GLADIUS' detachable 6.5-foot braided nylon cable is ideal for home use but is easily replaced with an included 3.3-foot rubber cable when traveling. Either cable stows easily along with the GLADIUS in the ROG drawstring nylon travel pouch.

THE PERFECT GIFT FOR: ANY GAMER WHO LIKES OPTIONS AND WANTS AN EDGE IN FPS TITLES.

#### THE PERFECT GIFT

## Thermaltake Core V51

\$109.99 • www.thermaltakeusa.com



Thermaltake kicked off its Core series of cases with the V71, a monstrous full-tower enclosure, and followed up with the Core V1, a Mini-ITX case that is surprisingly roomy despite its diminutive footprint. In case you're not sensing a pattern yet, Thermaltake has heard the plaintive cry of system builders everywhere and designed the Core series with our favorite thing: lots of space for high-end components and elaborate liquid-cooling systems.

The mid-tower Core V51 falls between its predecessors in overall size, but has a well-ventilated exterior and a roomy interior in common with both. Even with its internal drive cages in place, you can install a 12-inch graphics card (or four), and the interior of both the front and top panels can support radiators up to 420mm in length; you can mount single rads on the inside of the rear and bottom panels. In the event that you want to stick with air cooling for your CPU, the Core V51 lets you install a heatsink/fan combo up to seven inches and change high. In short, you can pack a lot of great stuff into this case. Oh, and it looks great and is budget-friendly, too.

THE PERFECT GIFT FOR: PEOPLE WHO LOVE BUILDING AND WORKING ON HIGH-PERFORMANCE, LIQUID-COOLED PCS.

#### THE PERFECT GIFT

## Oregon Aero Omega Plus Gaming Headset Upgrade Kit

\$85 • www.edgeprogaming.com



We can nitpick as much as we like when it comes to gaming headsets, but when it's time to buy, too many of us focus on sound quality at the expense of comfort. And those who do regret it almost immediately. Oregon Aero built a name for itself through solving comfort, ergonomic, and ambient noise problems for military and other professional pilots, and as you can imagine, fixing your headache-inducing gaming headset isn't exactly the Allied invasion of Normandy.

Part of Oregon Aero's EDGE (Extended Duration Gaming Equipment) product lineup, the Omega Plus gaming headset upgrade kit consists of a SoftTop Headset Cushion that pampers the top of your scalp, a pair of SoftSeal Ear Cushions that replace your headset's stock ear pads to make it comfortable to wear for hours on end, and a pair of memory foam HushKit inserts that fit under the ear cushion to create a superior barrier to ambient noise. The company also offers SoftSkin Ear Seal Covers that enhance the ear cushions for truly extended use, and the MicMuff Microphone Cover, which blocks unwanted noise for the benefit of your teammates.

THE PERFECT GIFT FOR: **GAMERS WHO LOVE THE SOUND OF THEIR** HEADSET BUT DON'T LOVE THE WAY IT FEELS ON THEIR HEAD.

#### THE PERFECT GIFT

## In Win iEar

\$14.99 • www.inwin-style.com



It's an age-old problem for gamers. Where do you hang your headset when you're not using it? Tossing it onto the desk can cause unnecessary wear and tear. And if you rest the headset on a desk drawer handle or chair arm, you might find yourself tripping on the dangling cord. In Win's iEar is an elegant solution for stowing your headset; this headset hanger has a suction cup that you twist and lock into place, so you can install it anywhere you can find a smooth surface, including the sides of most cases.

The knob-like cradle supports headsets with headbands up to 1.7 inches thick, and In Win rates the iEar for a maximum weight of 3.3 pounds. As such, it's sturdy enough to hold most all headsets, even those with large ear cans. And compared to headset hangers that anchor by screwing in to a desk or wall, the iEar won't leave behind any holes. The twist-and-lock design also makes it easy to switch to a different location, in case you're the type that often rearranges your desk.

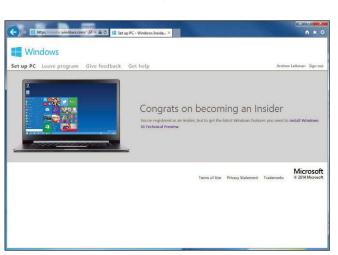
THE PERFECT GIFT FOR: GAMERS LOOKING FOR AN EASY WAY TO KEEP THEIR HEADSETS ACCESSIBLE AND SAFE.

## A Sneak Preview Of Windows 10

icrosoft recently gave the world an early look at the next version of the Windows operating system, Windows 10. As we went to press, there were numerous places you could go to watch someone else tool around the OS and babble about the UI, but here at CPU, we know you'd much rather explore the nooks and crannies of the software firsthand. Which is why this month we're giving you a thorough walkthrough to help you get the Windows 10 Technical Preview up and running on your PC.

#### **Caveats & Preparation**

Before you install any new operating system, especially one labeled "preview," it's a good idea to make sure you aren't risking any data or systems you rely on. According to Microsoft, as long as your computer can handle Windows 8.1, it can handle the Technical Preview, but during the installation process you'll get a green light if everything checks out, or you won't if something doesn't.



If you want access to the freshest updates, join Microsoft's Windows Insider program.



The hardware minimum requirements are a 1GHz or faster processor, 1GB of RAM for a 32-bit installation or 2GB of RAM for a 64-bit installation, 16GB storage capacity, a Microsoft

DirectX 9-capable graphics adapter with a WDDM (Windows Display Driver Model) driver, a Microsoft account, and web access.

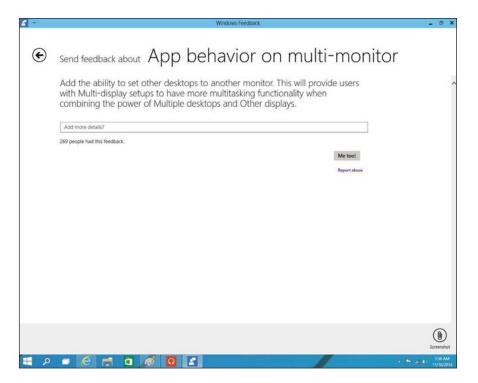
The Windows 10 Technical Preview will cease to function on April 15, 2015, and two weeks prior to that you'll get a notification of the impending lockout. In short, this OS is not going to be reliable, stable, or even 100% functional all the time, so plan accordingly.

#### What You Need

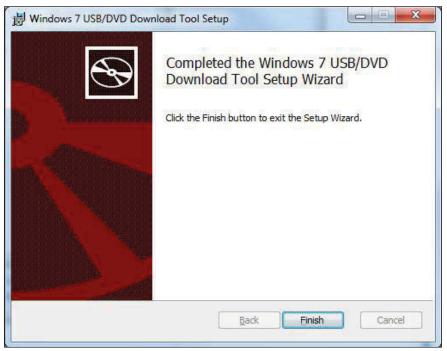
To perform this operation, you'll need a spare storage device (we're using a 600GB HDD) and a computer that meets the aforementioned minimum system requirements. We're installing the ISO using a 16GB USB drive, though you can use any USB drive 4GB and larger. Although you can install the ISO using recordable DVD or Blu-ray Disc media or desktop virtualization software such as VirtualBox, our tutorial will rely on the USB drive method.

#### **Get Inside**

To get started, you'll need to join the Windows Insider program by visiting insider.windows.com and clicking the Join Now button. Microsoft is using the program to



The Windows Feedback app is a good place view previously reported issues and make your voice heard.



The Windows 7 USB/DVD Download Tool is perfect for making a Windows 10 Technical Preview bootable USB drive.

deliver more frequent updates and early software builds, though they may be less polished as a result. For

instance, the text overlay on the bottom-right corner of the desktop reported our finalized installation was Build 9841, but following a reboot a few days later, we were running Build 9860. The term Technical Preview is not a misnomer, you may be in for a bumpy ride. Windows Insiders who install the experimental OS will also get access to the Windows Feedback app, which shows up as a live tile on the new Start menu and lets you give Microsoft detailed reports about features and functions that you believe are missing, poorly implemented, or causing issues. If you really don't want to enroll in the program, direct links to the Technical Preview were readily available as we went to press.

Next, sign in with your Microsoft account username and password or click the Sign Up Now hyperlink to create one. Click Continue if you encounter an updated terms page (you can get more details about the changes by clicking the Learn More About This Change hyperlink). Click I Accept on the terms of use and privacy statement screen, then click the Install Windows 10 Technical Preview hyperlink.

On the next page you'll see a large Start Upgrade Now button, which we only recommend if you're using a computer on which you don't mind performing a nuke and pave. Instead, for the purposes of this tutorial, click the Download The ISO Files hyperlink to proceed. On the following page you have the option to download 32-bit and 64-bit ISOs in English (U.S. and UK variants), Chinese, and Portuguese. Click the appropriate one, choose a save location, then click Save. Our 64-bit U.S. English ISO file weighed in at 3.81GB, which took about 15 minutes to download. Depending on your connection speed, it may take less or significantly longer. This page also displays your product key, and although we never had to type it in during installation or activation, it might be a good idea to write it down or otherwise save it someplace safe.

Microsoft recommends using a USB drive with at least 4GB of capacity, but we've noted that these can format

#### LOADING ZONE SOFTWARE TIPS & PROJECTS

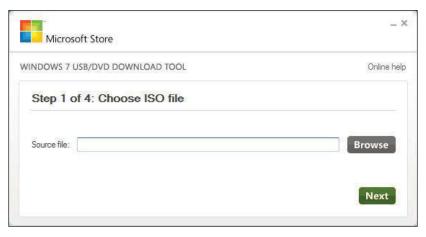
to between 3.6GB and 3.8GB, which may not be enough for the 64-bit installation files we plan to run. We're using a 16GB USB drive, but anything that will format to 4GB or more should work fine.

Next, we'll download the Windows 7 USB/DVD Download Tool, from wudt. codeplex.com. Despite this utility's name, it works fine for making

any ISO on a USB drive bootable. Click the Download button on the right side of the page, click Run to install the program, and follow the onscreen prompts to complete the operation.

Next, insert a 4GB or larger USB drive in a spare port on your computer and launch the Windows 7 USB/ DVD Download Tool. Click the Browse button, locate the Technical Preview ISO, (ours was named WindowsTechnicalPreview-x64-EN-US.ISO), and then click Open. Click Next, click the USB Device button, and then click the Begin Copying button on the following screen. You'll get a prompt informing you that the contents of the USB drive will be erased if you proceed; confirm the step and keep going. When the process is complete (it'll take 10 minutes or so), the utility will report that the bootable USB device has been created successfully.

The next step is to plug the newly created Windows 10 Technical Preview USB drive into a USB port on the computer you want to install it on. Make sure the PC is shut down, then press the power button and access the BIOS. The BIOS menu's interface and option names will differ greatly between different motherboards and chipsets, and there are a variety of ways of accessing the BIOS and changing



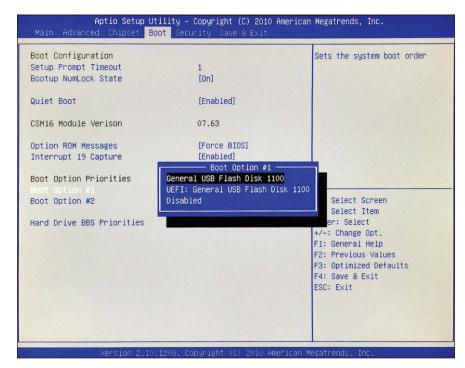
Just follow the Windows 7 USB/DVD Download Tool's instructions to copy the ISO to the drive.

the boot order. DELETE, F1, or F2 are common ways to access it while the computer boots, but you'll often get instructions onscreen during the early boot sequence. Once in the BIOS menu, you need to make the USB drive your first boot device, so look for a menu option such as Boot Sequence, Boot Priority, or Boot Menu. Once you've made the change,

save the changes and restart the computer. Then just follow the onscreen prompts to install the Technical Preview.

As the system boots from the USB device, the Windows logo appears onscreen followed by the Windows Setup License Terms page. Click I Accept, click Next, then click Custom: Install Windows Only (Advanced) option.

On the following screen, select the hard drive partition you want to use. To be on the safe side, we formatted the drive using the options on this screen and let the setup process generate new partitions. Click Next and the system will continue to install the Technical Preview. During our install, the first time the system rebooted, it did so from the USB



Your BIOS options may vary, but this is the menu we used to make the USB device our primary boot option.

drive, bringing us right back to the license terms screen. To reboot from the primary storage device, you can go back into the BIOS and remove the USB drive from its top spot, or just pull the USB drive from the port before rebooting. The system may reboot again, but when the installation is finished, one of the first things you will see is the Get Online option.

#### Windows 10 Test Drive

As we began to dig into the Technical Preview, Microsoft reminded us that "the design and feature set you see today only scratches the surface of what we have planned." In our limited exposure to the software, we noted a distinct lack of animations (particularly when clicking the Start button), some incomplete personalization options, and some graphics driver quirkiness. We expected to run into these sorts of things, however, and none of them were deal breakers as they had little impact on our overall experience with the new software.

One of the most obvious changes you're likely to notice compared to Windows 8.1 is the new—or, rather, returning-Start menu. Click the Windows icon in the lower-left corner for the taskbar; here you'll find a very Windows 7-like Start menu with power options (Sleep, Shutdown, and Restart), a list of commonly accessed Windows Explorer destinations, and recently opened programs and items. You can also edit the number of items that appear in the recent and frequent Jump Lists (the arrow adjacent to File Explorer, Control Panel, etc.) using the taskbar And Start Menu Properties dialog box, which you can launch by right-clicking an open space on the Start menu and clicking Properties.

To the right side of the Start menu is a space full of live tiles, which you can tweak similarly to how you could tweak the Windows 8.1 Start screen. To add new items here, just click the Start button, All Apps, right-click an



The Settings screen that appears shortly after successfully installing Windows 10 is very similar to that of Windows 8.1.



The Start menu does a good job of bringing back features we loved about previous versions of Windows without dumping the stuff we like from Windows 8.1.

## For Windows 10, Microsoft has decided to skip right over Windows 9 . . . .

app, then click Pin To Start. Just as before, you can resize the tiles and disable/enable live tiles as you see fit. If you miss Win8's old Start screen, you can revert to that setup using the aforementioned taskbar And Start Menu Properties dialog box.

Search is back in Windows 10 and you can find it both in the Start menu and on the taskbar. Click the magnifying glass icon from either location and begin typing to display results from the computer and from around the web.

The Windows App Store hasn't seen any noticeable changes, but now you have more options for using and viewing the apps on offer. Instead of running in a full-screen mode, apps now open in familiar windows, which lets you resize and move them around, as well as maximize, minimize, and close them via the new title bar buttons. As long as you're using the Start menu and not the dedicated Start screen al la Win8.1, traditional applications (read: non-Windows Store applications) and Windows Store apps all run in windows with title and scroll bars (where appropriate). Windows Store apps also have a new menu accessible on the left side of the title bar, with options such as Search, Share, Print, and Full Screen.

Multitasking is a big focus for Windows 10, and as such, Microsoft has several new features designed to make it easier to juggle

Taskbar and Start Menu Properties Taskbar Navigation Start Menu Toolbars Customize Start Menu ✓ Use the Start menu instead of the Start screen You can customize how links, icons, and menus look and behave on the ▼ Store and display recently opened programs in the Start menu Open submenus when I pause on them with the mouse pointer ▼ Store and display recently opened items in the Start menu and the Pin to Start list Default Programs Clear personal info from my Clear ✓ Documents Number of recent items to display in Jump Lists: 10 💠 Help To customize how links, icons, and menus look and behave in the Start menu, dick Customize. Customize Music Network ✓ PC Settings Personal Folde Pictures This PC Cancel Use Default Settings

The Technical Preview gives you a good deal of control over how the Start menu functions—or whether it's even present.

multiple workloads. The new Task View button on the taskbar that looks like a pair of overlapping rectangles lets you view all of your currently running apps and click one to make it prominent on your desktop. Window snapping is back, but now you have several more options for quickly displaying two or more apps. According to the Welcome To Tech Preview video linked on the desktop, Microsoft's Operating Systems Group VP Joe Belfiore says that clicking and dragging a window's title bar to one side of the screen to snap it there will display a handful of suggestions for how to fill the remaining space, with up to four apps. This behavior wasn't evident before we went to press in either of the builds we tested, but if Microsoft is calling it out, you can expect it to show up eventually.

Microsoft is also using Windows 10 as an excuse to add support for multiple desktops, which lets users run groups of similar tasks that are easily accessible from the Task View. In this way, you can have a browser, slide show, and word processing documents open on one desktop, yet keep music streaming or games open on an alternate desktop. Switching between the two is as easy as clicking the Task View button and clicking the appropriate desktop from the bottom of the screen.

#### **Two Louder**

For Windows 10, Microsoft has decided to skip right over Windows 9, which is a slightly unusual move, but not the worst naming scheme offense we've witnessed. The experience of installing the Technical Preview, despite Microsoft's warnings of potential instability, went smoothly and the procedure is remarkably similar to that of installing any recent Windows OS.

Based on our first impressions, it definitely feels like Microsoft is moderating its formerly tablet and touchscreen-centric UI choices with a more mouse and keyboard-friendly approach, which is a welcome shift in our opinion. Although the software does feel unpolished at this stage, we're looking forward to getting a feel for the Microsoft's OS plans in 2015 and beyond.

## Upgrades That'll Keep You Humming Along

Fix Internet Explorer vulnerabilities, grab support for iOS 8 devices and features, improve playback with Adobe Flash Player, and broaden compatibility for the latest GPUs with this month's slate of application upgrades and driver updates.

#### **SOFTWARE UPDATES**

#### **Adobe Flash Player 15**

Adobe has updated its Flash Runtime to version 15, and the update delivers a number bug fixes for Flash Player. For example, Flash Player 15 can scale content dynamically when the zoom factor changes in Internet Explorer on Windows 8.x. This will help to avoid playback failure and errors when using an IE zoom level other than 100%. If you're a Chrome user, you'll like that Adobe Flash Player 15 now enables hardware video decoding by default, which should help to both improve performance and reduce CPU usage on video players that support hardware video decoding.

www.adobe.com

#### Apple iCloud For Windows 4.0

If you're familiar with iCloud for Windows, you know that the client makes it possible to sync such items as your calendar, contacts, and emails among your PC and iOS devices. The 4.0 update introduces support for iCloud Drive, which is an online file storage service that works with all kinds of file types, including documents, spreadsheets, and PDFs. Any changes you make to the files in iCloud Drive will be updated across all of your iOS 8 devices, and you'll be able to access any of the documents you create on your iOS devices on your Windows PC.

www.apple.com/support

#### Apple iTunes 11.4

Apple iCloud For Windows isn't the only application you'll want to update if you have devices that run iOS 8. iTunes 11.4 allows you to sync the music, movies, and apps on your iOS 8 devices with iTunes.

www.apple.com/support

#### Microsoft Windows Update KB2987107

Internet Explorer users should make sure to install the KB2987107 patch, which is an update for last month's cumulative security update, KB2977629. This new cumulative security update resolves 14 additional vulnerabilities in IE, and it adds more validation requirements for items IE is working with in system memory to protect against exploits that could give unauthorized parties access to vulnerable systems at the user account level.

support.microsoft.com

#### Piriform CCleaner 4.19

In the latest free version of CCleaner (a popular utility for removing temporary files, cookies, and other leftovers), Piriform adds improvements to its Auto Update feature, as well as support for Windows 10 Preview installations. Version 4.19 also contains a few minor bug fixes and some tweaks to its user interface, as well as improved Opera 25 cache cleaning and an improved exception handling and reporting architecture. Piriform has announced that 4.19 will be the last update to version 4, as the CCleaner 5 beta will be available soon.

www.piriform.com

## Wagnard Mobile Display Driver Uninstaller 13.5.1.1

The Display Driver Uninstaller utility is designed to completely remove graphics card drivers from your PC, including leftovers like Registry keys and the driver store. The last few updates to this handy program included changes such as improved clean-up of NVIDIA's nView desktop software, removal of Quadro drivers, an

improved interface, patched code for GPU auto-selection, improved AMD Registry key removal, and more.

www.wagnardmobile.com

#### **DRIVER BAY**

#### **NVIDIA GeForce 344.60 WHQL**

NVIDIA introduced support for its newly released GeForce GTX 980 and GTX 970 graphics cards a couple drivers ago; the 344.60 driver builds on that with "GeForce Game Ready" support for Call of Duty: Advanced Warfare. It also delivers updates for NVIDIA's PhysX system software, HD Audio Driver, CUDA, and GeForce Experience software, as well as new and updated application profiles for Assassin's Creed Unity, Dead Rising 3, FIFA 15, Sid Meier's Civilization: Beyond Earth, and others. The driver also packs improved 3D Vision support for Dead Rising 3 and Strife, and fixes an issue where Alien: Isolation would hang when loading a level.

www.geforce.com/drivers

## Intel Iris & HD Graphics Driver 15.36.3.64.3907

Intel on-processor graphics receive a big boost with this driver, including up to 30% performance improvement for OpenCL workloads and up to 10% in games. It works with 4th Generation Intel Core Processors featuring Intel HD, Iris, and Iris Pro Graphics, as well as the new Intel Core M Processor with Intel HD Graphics 5300. The driver can also increase battery life on a laptop or tablet with a supported processor, too, thanks to new power conservation techniques. Intel has also improved the control panel interface by adding new media and display customization capabilities.

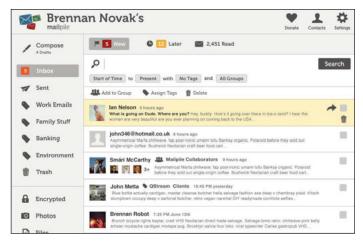
www.intel.com

## Inside The World Of Betas

#### **MAILPILE**

Mailpile is a particularly novel email client. The privacy-focused email software is built from the ground up to use OpenPGP encryption and signatures, so you won't need to run any add-ons to make the encryption work. The Mailpile client is designed to be installed on hardware you control, such as a PC, USB flash drive, home server, etc. The software handles the encryption in the background, and encrypting an email is as simple as

clicking the Lock icon in the compose window. Mailpile's search index is also encrypted, which keeps your email secure even if your PC or flash drive is stolen. The client opens in a web browser, and the interface is similar to



what you'd expect to encounter using a modern webmail provider.

When setting up Mailpile, you'll use an existing email address; configuration is similar to a traditional desktop client. Mailpile's encryption ensures the contents of the email

#### Mailpile

Publisher and URL: Mailpile; https://www.mailpile.is

ETA: Unknown

#### Why You Should Care:

Mailpile is an email client with integrated encryption and decryption, so it's ideal for those that want to keep their email private.

will be unreadable, including the copies stored on a webmail

provider's servers. The interface is intuitive, and search and tagging capabilities are provided to make it easy to find and manage your email. Mailpile is available for Windows, OS X, and Linux. ■

#### **MAXTHON NITRO**

Maxthon has long been an innovator in the web browser space. For example, in 2005 Maxthon designed was the first to introduce cloud-based bookmark and history syncing, and in 2007 Maxthon gave us sandboxed tabs. Blazing trails is nice, but blazing speed is, too. Nitro, Maxthon's newest release, is all about going fast. Maxthon optimizes Nitro to deliver the quickest start up and page load times by removing resource-intensive features, such as extensions, ad blockers, and cloud services. As such, Nitro is ideal for speed freaks.

One of the first things you'll notice when using Nitro is its minimalist user interface. For example, it's free of toolbars, search bars, and any bar that isn't the address bar. Even the theme seems muted. The simple design keeps Nitro from being bogged



down with features that cause delays. The clutter-free interface is easy to use, and the only elements outside of the main window are the address bar, home button, favorites button, and back button. Besides removing non-essential features, Maxthon also incorporates some smart technology to boost browser speed. For example, Nitro Publisher and URL: Maxthon: usa.maxthon.com/nitro ETA: December 2014 Why You Should Care: Like a race car, Maxthon has stripped down this web browser and thrown out anything that doesn't make it go faster.

Nitro uses algorithmic, pre-fetching technology that speeds up page render times by examining your browser and search history, as well as usage patterns. In our testing, the Nitro beta was certainly responsive and lived up to the Maxthon's claims. Throw caution to the wind, break out your stopwatch, and give it a try.



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# Authentication Times Two

#### Double Down On Your Security With Two-Factor Authentication

If you've never been hacked, consider vourself lucky. A May 2014 Ponemon Institute study found that 47% of U.S. adults have had personal data exposed over a 12-month period. The report points to a number of high-profile breaches that potentially provided cybercriminals with information to steal login credentials and/or credit/debit card information, including up to 110 million Target customers, 38 million active Adobe users' usernames and passwords, "a significant number" of the 120 million AOL accounts, and possibly all of eBay's 148 million users.

Of course, power users have already protected their accounts with long, random, nearly impossible to remember passwords. (Right?) But even ironclad passwords may not be enough as hackers accumulate usernames and passwords stolen from online databases. A recent report by Hold Security found that a Russian cybercrime gang was in possession of a staggering 1.2 billion unique username/password combinations.

It's always nice to be in complete control of your own security, so it's upsetting, to say the least, when data breaches and cybercriminal activity put you at the mercy of hackers. Thankfully, there are plenty of ways to further secure your accounts via multi-factor authentication, which adds another layer (or two) to the login process. Multifactor authentication greatly reduces the likelihood that a cybercriminal can break into an online account using a compromised username and password. In addition to taking a look at some current and future multi-factor authentication implementations, we'll show you how to set up additional account security with a few popular online services.

#### **Multi-Factor Passwords**

Most online services that offer multifactor authentication use a OTP (onetime password) in conjunction with the tried-and-true username and password. Arguably the most popular OTP delivery method is a simple text message.

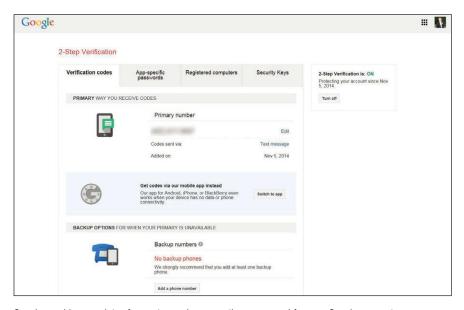
"The high level of penetration of cellular phones make it a convenient way to do two-factor or multi-factor authentication," says James McCloskey, senior consulting analyst at Info-Tech Research Group. "People tend to always have their phone with them, and just as they wouldn't think of leaving the house without their keys, they also won't leave without their smartphone. That's a strong authentication mechanism."

Once you receive the PIN or code, you'll just need to enter the OTP as prompted by the website. The multifactor authentication prompt will typically occur after you've entered your

username and password. Using the SMS format is also an advantage because you don't have to own a smartphone to receive the code. "Mobile devices can provide a huge boost to multi-factor authentication, since even feature phones can be used to deliver multi-factor authentication codes," says Michela Menting, cybersecurity practice director at ABI Research.

Sending a code via text message might also be more convenient than other OTP delivery methods, which can include email, a discrete app on your smartphone or tablet, or a hardware token for your keychain. You might also be able to have a OTP issued via a phone call, which is obviously ideal if you're one of the seven people in the world whose mobile plan doesn't include text messaging. An email OTP can be helpful if you have easy access to your email client, for example.

If entering a code each and every time you log in sounds exhausting, you're



Google provides a variety of ways to receive a one-time password for your Google account.

#### Two-step verification

Your account is protected by two-step verification

Turn off two-step verification

#### Identity verification apps

You've set up an authenticator app. Learn more about identity verification apps.

Set up

Turn off existing apps

#### App passwords

Some apps and devices (such as Xbox 360, Windows Phone, or mail apps on your other devices) don't support security codes for two-step verification. In these cases, you need to create an app password to sign in. Learn more about app passwords.

Create a new app password

Remove existing app passwords

#### Recovery code

You can use your recovery code if you lose access to your security info. You need to print out your recovery code and keep it in a safe place.

Replace

#### Trusted devices

On your trusted devices, you don't have to enter a security code to access sensitive info (such as your credit card details). Learn more about trusted devices.

Remove all the trusted devices associated with my account

Within the security settings of your Microsoft account, there's an option for two-step verification.

not alone. "Two-factor authentication is still an extra step people have to take, and many will simply find it a hassle and not bother," says Menting. Aware of this, many services that require logins are simplifying the process, so you'll only need to enter a PIN if the website detects a login attempt from an unfamiliar device or location.

"To different degrees, banks and social networks are making use of context-aware, adaptive techniques and phone-as-a-token solutions," says Ant Allan, research vice president at Gartner. "For example, if you try to access Facebook from an unknown endpoint, it can prompt multi-factor authentication."

Another alternative is the TOTP (time-based OTP) that you can access via an app on your smartphone or tablet. OTP apps typically require you to configure the device with your account credentials. Once complete, the software token app generates the PIN based on an algorithm,

the time on your mobile device, and a "seed record." The latter is a secret key that's stored on the online service's server.

An TOTP app generates a new code periodically, so even if a hacker intercepted the code, it'll only be good for a short period of time. Google Authenticator is a popular TOTP that you can use with Google's various offerings, as well as some other prominent online services, such as Amazon Web Services, Dropbox, and LastPass. The app creates a new PIN every 30 seconds and is available for Android, BlackBerry, and iOS devices. The big benefit of the time-based OTP app, compared to an SMS message, is that it works even if your smartphone doesn't have a data or cellular connection.

Regardless of delivery method, OTPs will continue to be a popular option for two-step verification, according to experts. "With online services, a username and password with a code that's delivered to your smartphone is rapidly becoming the standard combination," says McCloskey.

We found that some banks might offer to provide you with a hardware token, but there are some challenges involved with using to hardware tokens with online services. McCloskey says, "Practically speaking, the hardware tokens aren't something that will take off, because you'd have a token for every online service that you're working with." As such, most online services will continue to send passcodes via SMS or work with a soft token app in the near future.

#### **Biometrics**

With fingerprint readers and highresolution cameras now available on

"To different degrees, banks and social networks are making use of context-aware, adaptive techniques and phone-as-a-token solutions."

-Ant Allan, research vipce president, Gartner

smartphones and tablets, you would think that biometrics would be an upand-coming method for multi-factor authentication. Unfortunately, there are some major obstacles to overcome when it comes to biometrics as an extra layer of authentication. "It really becomes a privacy issue," says McCloskey.

For example, a password can always be changed, but if a cybercriminal were to steal your thumbprint or voice identification, he could use the compromised biometric data to impersonate you forever. "In what format would Apple or Google share the biometric information? How would you do the registration of that biometric with a third-party?" McCloskey asks. Until the privacy challenges are resolved, it would be difficult for online services to accept a fingerprint.

When it comes to securing physical access to a location, biometrics have been a proven option for businesses with sensitive data, such as data centers utilizing fingerprint readers or retinal scanners. But in these situations, the person providing the biometrics has also had their identity verified in a traditional way. They might be an employee, or the organization might have already verified their identity with a social security number, for example.

With something like a Google account, registration doesn't typically require any proof of identity when you set up the account. McCloskey says, "It's almost backwards to expect a stronger identification mechanism that would uniquely identify you. That's why a smartphone is a better 'thing to bring' than a fingerprint or face, which is a private piece of information, to enroll with an online service."

Still, it's not impossible to imagine biometrics catching on outside of casino vaults and secret government bunkers. Mobile devices have only recently started including biometric sensors, so there hasn't been much time for third parties to develop a policies to manage a fingerprint or iris template, nor how the biometic data will be securely transmitted to the



On Facebook, you can move to two-factor authentication by making changes to the Login Approvals and Code Generator settings.

server. Time will tell if online services will incorporate biometrics into their authentication methods.

You might see biometrics used as authentication for other tasks. "Biometrics will play an important role in digital identification cards most likely, notably government and healthcare identity cards," says Menting.

Besides fingerprint and iris or face recognition, online services might one day be able to use behavioral authentication as a second factor. Some examples of behavioral traits that can be used include the way you speak a phrase or the speed at which you type on a keyboard. "Multimodal face plus keyboard/gesture dynamics could provide continuous passive authentication, providing at least a medium level of trust with a great user experience," Allan says.

#### **Multi-Factor Authentication Setup**

Although a variety of online services now offer multi-factor authentication, it's almost always optional. And you must register and configure multi-factor authentication before securing your accounts. We'll detail processes you'll

need to go through to set up multi-factor authentication with a few of today's popular online services.

Microsoft. If you're looking to boost the security of your Outlook.com, OneDrive, and Xbox Live accounts, it's relatively easy to add two-step verification to your Microsoft account. Even better, you can configure the multi-factor authentication so that it only occurs if you sign in from a device that isn't trusted. You make a device trusted by clicking the "I Sign In Frequently On This Device. Don't Ask Me For a Code" checkbox after you've successfully entered the two-factor security code.

To initially set up two-factor authentication, sign in to your Microsoft account at https://account.live.com. Next, click Change Password & More under Security & Privacy. At this point, Microsoft will likely prompt you for a security code, just like you'd see with twofactor authentication, but this prompt occurs because you might be changing sensitive information. You can receive the code via text or an alternate email. Under Two-step Verification, click Set Up Two-Step Verification.

The next screen will inform you of how the twostep verification will work. Click Next, and you'll see a recovery code that you can use to restore access to your account if you lose your mobile phone or a hacker breaks into your account. Once you've securely stored the code, click Next. Microsoft then indicates that you'll need to take a few steps to make certain that all of your apps and devices will still work with your Microsoft account, because some apps and devices (including Xbox 360) require special setup. For example, on our mobile device, we had to go into the settings and replace the password with a long letter and number code.

The alternative setup is necessary because the apps and devices won't prompt for the second factor of authentication, such as you'll see on Outlook. com or OneDrive. Next,

Microsoft will remind you about some other apps and devices that might require special setup, including the Outlook desktop app, Microsoft Office, and Windows Essentials apps. A link is provided, so you can configure each individual app you might be using. You can complete these steps at a later time if desired.

Finally, you can opt to receive the code via text message, email, or app. As of press time, Microsoft used Google's Authenticator app for a TOTP. The SMS and email options are easy to configure, especially if you've provided Microsoft with your phone number or alternative email in the past. And you can quickly enter the data, even if you haven't provided it. With the app, you'll need to download Google's Authenticator and configure your smartphone or tablet for use as a soft token. This process consists

Security and privacy Change your security and privacy settings.	
Security	
Login verification	O Don't verify login requests
	Send login verification requests to +⁻
	After you log in, Twitter will send a SMS message with a code that you'll need to access your account.
	<ul> <li>Send login verification requests to the Twitter app</li> </ul>
	Approve requests with one tap when you enroll in login verification on Twitter for iPhone or Twitter for Android. Learn more
	You will need to generate a temporary password to log in to your Twitter account on other devices and apps. Learn more
Password reset	Require personal information to reset my password
	When you check this box, you will be required to verify additional information before you can request a password reset with just your @username. If you have a phone number on your account, you will be asked to verify that phone number before you can request a password reset with just your email address.
Privacy	
Photo tagging	<ul> <li>Allow anyone to tag me in photos</li> </ul>
	Only allow people I follow to tag me in photos
	O Do not allow anyone to tag me in photos
Tweet privacy	☐ Protect my Tweets
	If selected, only those you approve will receive your Tweets. Your future Tweets will not be available publicly. Tweets posted previously may still be publicly visible in some places. Learn more.
Tweet location	☐ Add a location to my Tweets
	When you tweet with a location, Twitter stores that location. You can switch location on/off before each Tweet. Learn more

Twitter lets you receive a OTP via SMS or verification requests through the Twitter app.

of entering a key or scanning a QR code, which will generate a passcode on your mobile device. Then, you'll enter the passcode on the Microsoft account setup page. Google Authenticator and your smartphone/tablet can now be used as a second form of authentication.

Microsoft makes the setup fairly painless, though you might have to jump through a few additional hoops to set up certain apps or your Xbox 360. Typically, you'll need to log in to your Microsoft account, visit the Security Info Page, and write down an app password. That password will replace the password you typically use to sign in to your Microsoft account on the app or your Xbox. Microsoft does offer a Remember Me checkbox with the apps, so you won't need to enter the custom code each time you open the app. On a PC, you can reduce time spent logging in by trusting your

devices that regularly access your Microsoft account.

Google. Google is wellknown for making the vast majority of its services available online, including Gmail, Google Drive, and Google Calendar. Naturally, you can improve the security of these services by using two-step verification. The easiest way to set up multifactor authentication is to go to https://www.google.com /landing/2step/, click Get Started, and log in to your Google account. Next, click Start Setup, and Google will ask you to provide a phone number to send a numeric code or a voice call that verbalizes the PIN. Once you choose a method, click Send Code button. On the next screen, enter the code and click Verify.

Next, Google will ask if you want to set up the PC as a Trusted Computer. This way, you can access Google accounts without entering a verification code

every time you log in to that system. Finally, Google informs you that you'll be asked for a code whenever you sign in from an untrusted computer or device. Click Confirm, and the two-factor authentication is ready to go.

Similar to the Microsoft setup, there are some apps that you'll probably need to validate to use with the two-step authentication. After you click Confirm, a pop-up window will appear that provides directions to reconfigure app access. Just select the app of choice, such as Mail, and your device, such as iPhone, from the drop-down menus, and Google will provide you with a replacement password that you can enter. Google can provide codes with apps for its services on iPhone, iPad, Mac, BlackBerry, Windows Phone, and Windows PCs.

When you first log in using two-factor authentication on a PC, you'll see an option

#### DIGITAL LIVING GEN NET

to remember that particular computer. This way, you won't have to deal with re-entering a new verification code, but you'll still be protected against hackers trying to access your account from another PC.

Google's default options for two-step authentication are SMS or voice call. To use Google Authenticator instead, open your Google account settings and select the Security tab. Then, click the Settings option next to 2-Step Verification. Click the Switch To App button. You'll receive a prompt to use your phone's camera to scan the onscreen QR code, which will produce the 6-digit verification code in Google Authenticator. Enter the code on the Google account web page to enroll your mobile device with the Google Authenticator app.

Google also lets you configure your account with a backup phone number or backup codes for the times when you don't have your primary phone in hand. With the backup codes, Google will provide you with 10 8-digit codes that you can use to log in. Each code can only be used one time, but you can generate new codes if you're close to running out.

We like that Google offers a variety of alternatives for the code delivered via text message or a phone call. The backup options are particularly appealing for people that depend heavily on access to Google's online services, because you'll always have a way to enter the two-factor authentication from PCs away from home.

Facebook. At the very least, it's embarrassing when your social media accounts are hacked. All of your friends, acquaintances, and relatives will be exposed to clickbait that could lead them to malware. A hacker may also flood your feed with offensive content. Thankfully, Facebook can work with a wide variety of OTP authentication methods, including text message, voice call, and a Code Generator within the Facebook app.

If you want to use the SMS or voice call options, you'll need to add your phone number to your Facebook profile. If you're concerned about letting "friends" see your phone number, you can make the number visible to only yourself. To set up phonebased two-factor authentication, visit your

Facebook home page, click the Lock icon, and select Settings. Click Security and choose Login Approvals. Click the Require A Security Code To Access My Account From Unknown Browsers checkbox. After you click Get Started, Facebook will notify you that two-factor PINs can't be delivered to landlines or Google Voice numbers.

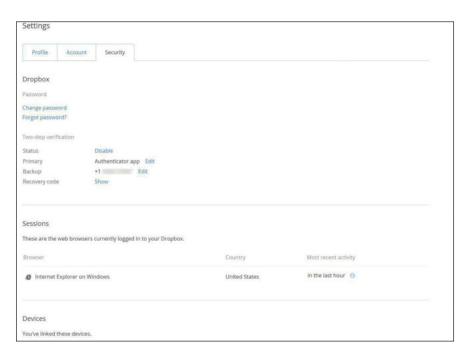
In the Set Up Security Code Delivery window, add your phone number and click Continue. Facebook will send you a text message with a confirmation code, which you'll need to enter in the following pop-up window. By default, Facebook will require the secondary authentication if you log in from an unknown browser, but if you prefer to always enter the PIN, you can select the No Thanks, Require A Code Right Away checkbox.

To hide your phone number from your friends, you'll need to go to your personal timeline, click About, select Contact Information And Basic Info, click the Edit box, and select the Lock icon to bring up a drop-down menu where you can select Only Me.

If you'd prefer to use a code produced from the Facebook app, return to the Security section of your profile and click Code Generator. Select Enable and follow the instructions to activate Code Generator on your phone. Both the Login Approvals and Code Generator options can be active at the same time, so you can use either OTP as a second form of verification. In our testing, Facebook asked for the Code Generator PIN first but allowed you to select the text message delivery as an option. Facebook also lets you print security codes, which you can use to log in if you don't have your smartphone.

Twitter. Twitter hackers are some of the worst, filling up people's timelines with obscene messages. If you want to add a second layer of authentication to your Twitter account, you'll need to take the following steps: Sign in to Twitter and bring up your account settings. Click Security And Privacy. You can choose between Send Login Verification Requests To My Phone or Send Login Verification Requests To The Twitter App. The latter method works with the Twitter app for iOS or Android.

To add your phone number, click the Add A Phone link and follow the prompt to verify your number. The simple process consists of Twitter sending a test text to



Dropbox can work with a variety of TOTP apps. You can also use an SMS OTP.

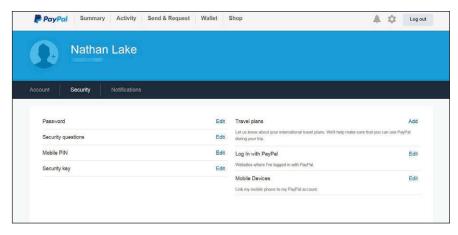
your phone; enter the code to enroll the phone. When you set up login verification via an iOS or Android device, you'll also need to have a phone associated with your Twitter account, and you can follow the steps listed above to enroll your smartphone. Then, go to the Me tab in the Twitter app, click the Gear icon, and select Settings. Choose your account name and turn on app authentication by checking the box next to Login Verifications.

Twitter will also provide a backup code, which you can use if your phone lacks access to the Internet. When prompted, you can approve login requests just by opening the Twitter app and selecting the push notification.

Twitter's app verification method is one of the easier forms of two-factor authentication we've seen, because you won't need to enter any codes. However, Twitter doesn't currently offer a way to trust a device, so you'll always need to enter the code or verify via the Twitter app. Still, it beats having your Twitter account hijacked.

**Dropbox.** Setting up two-factor authentication is an excellent idea if you store sensitive files in your Dropbox folder. Begin by logging in to your account and clicking your name in the upper-right corner of the screen. Next, choose the Settings button, select the Security tab, and click Enable under Two-step Verification, which opens a pop-up window where you'll enroll your mobile device.

Dropbox starts by informing you of two-step authentication benefits. To continue, click the Get Started button and enter your account password. Next, Dropbox will ask if you would like to receive the security code via text message or the mobile app. If you select Use Text Messages, you'll just need to enter your mobile phone number, and Dropbox will text you the code that you'll enter into the pop-up window. We like that you also have the option to configure a backup phone number, if you want an alternative way to receive the OTP. Finally, Dropbox will provide you with an emergency backup code to use if you lose your phone or it doesn't have service.



When using PayPal, you can configure multi-factor authentication under the Security tab.

Click Enable Two-Step Verification to finish the process.

If you select the mobile app option, click the These Apps link in the resulting pop-up window to see which authenticator apps are compatible with your device. As of press time, Dropbox worked with Google Authenticator (Android/iOS/BlackBerry), Duo Mobile (Android/iOS), Amazon AWS MFA (Android), and Authenticator (Windows Phone 7). Once you've downloaded the app, return to the Dropbox window and scan the on-screen barcode to enroll your phone. Next, Dropbox will ask if you want to enter an optional backup mobile phone number, so you can receive a code if the app isn't functional.

Once you log in using the two-step authentication, Dropbox lets you set up the web browser and PC as a trusted source. Within your account settings, you can see the entire list of approved PCs, too. The process is simple and quick, too.

PayPal. It makes a lot of sense to use two-factor authentication for managing your online finances. Like the other services we've covered, PayPal accounts can be protected by a code sent to your mobile phone. However, PayPal also gives you the option to purchase your own hardware token. Called PayPal Security Key, the token is the size of a credit card and costs \$29.95. PayPal won't charge you to receive a OTP code via your mobile phone.

To set up SMS-based two-factor authentication, log in to PayPal and click the Gear button. Select the Security tab and click the Edit button next to Security Key. Click the Get Security Key link, which will bring up a page where you can enroll your mobile phone. Enter your phone number, and PayPal will send you a text message with a confirmation code. Click the Agree And Register button, enter the six digit code, and click Activate. The next time you log in, PayPal will prompt you with an Enter Security Code window where you'll need to click a Send SMS button and enter the confirmation code. PayPal doesn't currently offer a way to trust a device, which means you'll need to enter the extra authentication code every time you log in.

#### **Two Factors Everywhere**

There are plenty of other websites that offer two-factor authentication, including Apple, Evernote, Yahoo!, and LinkedIn. If you haven't already made the move, we recommend that you consider the additional security of two-factor authentication for any online service that stores your personal information. Most online services offer a way to save a device as a trusted source, so the process isn't too time-consuming after the initial setup. In the digital security arms race, it's nice to have any option that puts us in more control of our account security.

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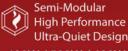








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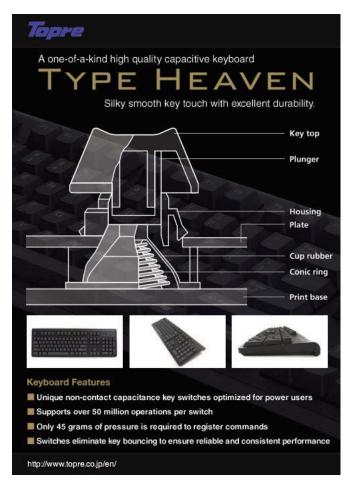
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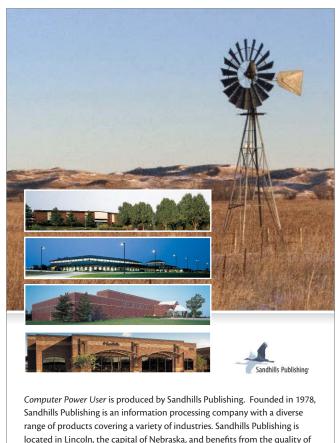
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www.sandiegolan.net

11.22.14

Willamette Valley Gamers LAN Eugene, OR

www.wvgamers.com

12.05-07.14

LANtastic V Waterloo, ON

lantastic.ca

12.12-14.14

LANFest InfernaLAN\* Dupont, WA

lanfest.intel.com

12.26.14

The LAN Down Unda Prattville, AL

facebook.com/tricountylan

12.20.14

NGC's LAN-A-GEDDON Greenville, TX

www.networkgamingclub.com

01.09-11.15

Kansas LAN X Lyons, KS

kansaslan.com

01.10-11.15

LANFest Presents: Laclede's LAN 14\* St. Louis, MO

lanfest.intel.com

01.16-18.15

LANFest MLP'015 Winter\*

Hamburg, NY lanfest.intel.com

01.16-18.15

LANWAR 56

Louisville, KY

www.lanwar.com

01.23-25.15

**PAX South** 

San Antonio, TX

south.paxsite.com

02.06-08.15

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lanfest.intel.com

#### 02.27-03.01.15

GottaCon 2015 Victoria, BC

www.gottacon.com

#### 03.06-08.15

PONG LAN Menomonie, WI

pong.uwstout.edu

#### 03.13-15.15

BelleCon 2015 Jacksonville, FL

belleconventions.com

#### 03.14-15.15

FortLAN VI

Fort Wayne, IN

www.fortlan.org

#### 03.20-22.15

SalukiLAN

Carbondale, IL

www.salukilan.com

#### 04.17-19.15

VectorLAN 6 Portland, OR

pdxlan.net

#### 04.17-19.15

AWOL LAN 25 Eau Claire, WI

www.awollan.com

#### 04.25-26.15

NeXus LAN Miamisburg, OH

www.nexuslan.org

#### 07.17-20.15

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Portland, OR

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#### 07.17-19.15

Ancient City Con 9
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### **Q&A With Kelly Meeneghan Peters**

# 1&1's WordPress Offerings Power Up Web Hosting

As a manager for 1&1 Internet, Inc., Kelly Meeneghan Peters is an industry specialist, providing expert advice on how businesses can grow their business online through websites and online marketing methods. 1&1, a global leader among web hosts, offers companies the tools necessary to get online and be successful. For more information visit www.landl.com.

#### : For starters, can you explain what WordPress is and how it fits into 1&1's hosting options?

KMP: WordPress is software that can be used to create, edit, and publish content on the web. Free to download, it is an open-source application that allows users to build and fully customize a wide range of projects online, including websites, applications, and blogs, to name a few. Web projects can be achieved without the need to implement complicated code, making WordPress appealing to users of many skill levels.

Also contributing to WordPress' global appeal is the community of developers who are always working to progress the functionality of the platform. Modifications and updates to the platform are constant to ensure users are staying secure while leveraging the latest and greatest Web elements.

Today, WordPress is responsible for powering one in every four new websites created—that is tens of thousands of sites every day. 1&1 built a portfolio with this in mind, offering an optimized workflow and improved experience for these users. The new interface caters to the needs of both novice and expert users of the popular CMS (content management system). A



simplified installation process as well as a new WordPress plug-in, exclusively available to 1&1 customers, enables a WordPress project to be configured in just three easy steps.

: What kind of technical knowledge does one need to work with WordPress, and does 1&1 offer any educational resources for working with WordPress?

KMP: WordPress is a great tool for users of all experience levels. User-friendly plug-ins and themes allow the less tech-savvy

users to create a fully functional and attractive web presence. On the other hand, those with coding knowledge can leverage optimal customization capabilities for a completely unique web project.

Earlier this year, 1&1 introduced a community portal to unite WordPress users with developers and experts worldwide. The 1&1 Community (community.1and1.com) allows both experts and novices to further expand their knowledge of creating websites and developing web projects within a comfortable platform. This advice, coupled with examples of real websites built by WordPress power users, will inspire visitors to apply new concepts to their own web projects.

: It seems like there's a pretty sizable WordPress community, and that lots of these folks like to collaborate and offer helpful advice to other users. Can you talk about the kinds of help users can get, and where should they go to check it out?

KMP: WordPress operates first and foremost as a community. The improvements and innovations all depend upon WordPress enthusiasts who volunteer their time and knowledge to help

further develop and perfect the CMS, as well as create new plug-ins and themes. Ranging from professed techies to non-techies who are passionate about WordPress, the community champions itself and connects via conferences called "WordCamps" across the world. At these events, contributors are invited to come together to strengthen their knowledge base to get better connected to each other and Word-Press itself. This helps drive a global community through local involvement.

In addition to having in-house WordPress experts contributing to the community development, 1&1 has recently introduced the 1&1 Site Manager Plugin. Available for free in the WordPress Plugin Directory, it improves stability and security by automatically updating WordPress installations, themes, and plug-ins. In addition, it is possible to customize the update settings and tailor them to specific needs and knowledge.



"WordPress operates first and foremost as a community."

—Kelly Meeneghan Peters

: Security is a big issue online, obviously. What kind of security features does WordPress offer, and what can 1&1 do to help?

KMP: As a website gets bigger and more popular, it is also increasingly more inviting to hackers. The security of an online presence should be taken very seriously, and WordPress makes it easier than any other content management system.

When it comes to installation, 1&1 has incorporated two unique methods varying in managed security levels: Free Mode and Safe Mode. While Free Mode caters towards more experienced

web professionals and requires more maintenance on their end, Safe Mode is best suited for small- and medium-sized businesses with less technical expertise. With this option, 1&1 carries out all necessary actions for maintaining a safe WordPress environment. For example, using outdated software on your website leaves an open door for possible malicious activity. The Safe Mode option provides security updates and regular maintenance, offering the convenience of a fully managed platform completely secured by 1&1's experienced team of technicians. As a business' demands increase, the method can be switched to Free

Mode to allow for more customization freedom. The website look and content will not be altered during this fast, seamless process. Experienced web professionals will find comfort in the flexibility of this option.

Themes and plug-ins are constantly being updated and further developed. Once in a while, it is necessary to check if new versions are available for your WordPress backend. Perfect for this purpose is the 1&1 Site Manager, a very useful free plug-in which automatically updates plug-ins and themes of your choice; therefore safety is just one click away.

Furthermore, web hosts like 1&1 have the power to staff experienced technicians to handle all maintenance within their own data center, around the clock. This ensures that the technical backend of a website is supported and protected at all times.

Now that WordPress has advanced through several versions, you probably have figured out a sort of trajectory for it based on adoption rates and usage scenarios. What kind of plans does 1&1 have for WordPress going forward?

KMP: One of the most exciting things about WordPress is that it is constantly evolving and improving. What is planned for today may change tomorrow. That said, 1&1 has a team of experts that is heavily involved in the WordPress community and we will continue to adapt our solutions to meet the demands and trends of the user base.



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